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(54) HEAT-DEVELOPABLE PHOTSENSITIVE MATERIAL

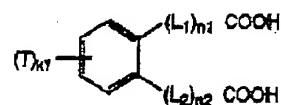
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(57) Abstract:

PROBLEM TO BE SOLVED: To obtain a heat-developable photosensitive material giving an image having a low fog and a high maximum density and less liable to the rise of fog in preservation by using a latex of a specified polymer, holding a specified organic acid compound and a nucleus forming agent on a side with an image forming layer and specifying the pH of the film surface on the image forming layer side.

SOLUTION: A latex of a polymer having -30 to +40°C glass transition temperature is used as 350 wt.% of the binder of an image forming layer containing a nonphotosensitive silver salt and a photosensitive silver halide. At least one organic acid compound of the formula and a nucleus forming agent are held on a side with the image forming layer and the pH of the film surface on the image forming layer side is 26. In the formula, T is a monovalent substituent, k1 is an integer of 0-4, in the case of k1≥2, plural symbols T may bond to each other to form a ring, each of L1 and L2 is a combining group and each of n1 and n2 is an integer of



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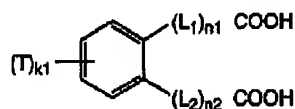
CLAIMS

[Claim(s)]

[Claim 1] In the heat developing sensitive material which has nonphotosensitivity silver salt, a photosensitive silver halide, and a binder on a base material The latex of -30-degree-C or more glass transition temperature [40 degree-C or less] polymer is used as 50% of the weight or more of the binder of the image formation layer containing nonphotosensitivity silver salt and a photosensitive silver halide. And heat developing sensitive material which has a kind and ***** for the organic-acid compound expressed with the following formula (A) to the side which has an image formation layer at least, and is characterized by the film surface pH by the side of an image formation layer being six or less.

[Formula 1]

式 (A)

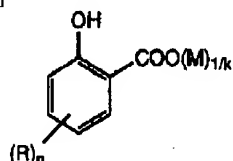


T expresses a univalent substituent among [formula (A)], and k_1 expresses or more 0 four or less integer. It expresses that the whole of $k_1=0$ is a hydrogen atom, and in the case of $k_1 \geq 2$, it may differ, even if the same, and it may join together mutually, and two or more T may form the ring, respectively. L1 and L2 express a connection machine. n_1 and n_2 express or more 0 30 or less integer.]

[Claim 2] Heat developing sensitive material of the claim 1 which ***** at least the compound further expressed with the following formula (B) to the side which has an image formation layer.

[Formula 2]

式 (B)



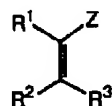
M expresses the cation of a hydrogen atom or k^{**} among [formula (B)], and k expresses one or more integers. R expresses a substituent, n is the integer of 1-4, it may differ, even if the same, and it may join together mutually, and R of case plurality of $n \geq 2$ may form the ring.]

[Claim 3] Heat developing sensitive material of the claims 1 or 2 which use ammonia for regulation of a film surface pH at least.

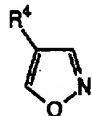
[Claim 4] One heat developing sensitive material of the claims 1-3 which are a kind of compounds chosen from the substitution alkene derivative by which ***** is expressed with the following formula (1), the substitution isoxazole derivative expressed with the following formula (2), and the specific acetal compound expressed with the following formula (3) at least.

[Formula 3]

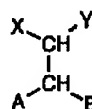
式 (1)



式 (2)



式 (3)



In [formula (1), R1, R2, and R3 express a hydrogen atom or a substituent independently, respectively, and Z expresses an

electronic suction nature machine or a silyl machine. In a formula (1), it may join together mutually, respectively and R2, R3, R1 and R2, and R3 and Z may form the cyclic structure. [R1, Z,] In a formula (2), R4 expresses a substituent. In a formula (3), X and Y express a hydrogen atom or a substituent independently, respectively, and A and B express an alkoxy group, an alkyl thio machine, an alkylamino machine, an aryloxy group, an aryl thio machine, the Ernie Reno machine, a heterocycle oxy-basis, a heterocycle thio machine, or the heterocycle amino group independently, respectively. In a formula (3), it may join together mutually, respectively and X, Y, and A and B may form the cyclic structure.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the heat developing sensitive material for photoengraving process with Dmax (the highest concentration) able for fogging to be low in more detail and to acquire a picture with little elevation of fogging at the time of preservation highly about the scanner and the heat developing sensitive material for imagesetters which fitted especially photoengraving process about heat developing sensitive material.

[0002]

[Description of the Prior Art] It has a photosensitive layer on a base material, and many sensitive material which performs image formation by carrying out picture exposure is known. Also in them, the technology which forms a picture with heat developing is mentioned as a system which can simplify environmental preservation and an image formation means.

[0003] In the photoengraving-process field, loss in quantity of processing waste fluid is strongly desired from a viewpoint of environmental preservation and a ** space in recent years. Then, it can be made to expose efficiently with a laser scanner or a laser imagesetter, and the technology about the heat developing sensitive material of the photoengraving-process use which can form the clear black picture which has high resolution and sharpness is needed. In these heat developing sensitive material, use of solution system processing chemicals is lost, it is more easy and the heat developing processing system which does not spoil environment can be supplied to a customer.

[0004] The method of forming a picture with heat developing For example, U.S. Pat. No. 3,152,904, Said 3,457,075 numbers, And it is based on B. sherry (Shely) with D. Morgan (Morgan). "with heat the silver system (Thermally Processed Silver Systems) A processed" (the Imaging Processes and Materials (Imaging Processes and Materials) Neblette octavus version --) It is indicated in Sturge (Sturge), V. Walworth (Walworth), A. Shepp (Shepp) edit, the 2nd page, and 1969. Such a sensitive material contains nonphotosensitivity reducible **** (for example, organic silver salt) and the reducible photocatalyst (for example, silver halide) of the amount of catalytic activity, and the silver reducing agent in the state where it usually distributed in the organic binder matrix. In ordinary temperature, although sensitive material is stable, when it heats to the elevated temperature after exposure (for example, 80 degrees C or more), it generates silver through the oxidation-reduction reaction between reducible **** (it functions as an oxidizer) and reducing agents. This oxidation-reduction reaction is promoted by the catalysis of the latent image generated in exposure. The silver generated by the reaction of the silver salt in which the reduction in an exposure field is possible offers a black picture, and, as for this, formation of nothing and a picture is made in a non-exposing field and contrast.

[0005] Moreover, although the aforementioned heat developing sensitive material is known from the former, these many form the photosensitive layer by applying the application liquid which uses organic solvents, such as toluene, a methyl ethyl ketone (MEK), and a methanol, as a solvent. The cost top of using the organic solvent as a solvent is also disadvantageous because of recovery and others of not only the bad influence to the human body in a manufacturing process but a solvent.

[0006] Then, such an anxious method of forming a photosensitive layer (it being henceforth called a "drainage system photosensitivity layer".) using the application liquid of the aqueous intermediation which is not is considered. For example, the example which uses gelatin as a binder is indicated by JP,49-52626,A and JP,53-116144,A. Moreover, the example which uses polyvinyl alcohol as a binder is indicated by JP,50-151138,A.

[0007] Furthermore, the example which used gelatin and polyvinyl alcohol together is indicated by JP,60-61747,A. The example of the photosensitive layer which uses a water-soluble polyvinyl acetal as a binder is indicated by JP,58-28737,A as examples other than this.

[0008] When such [to be sure] a binder is used, a photosensitive layer can be formed using the application liquid of aqueous intermediation, and the merit of an environmental side and a cost side is large.

[0009] However, only what was spoiled remarkably [of goods / be / high / the optical density of the exposure section is low in becoming the brown which was widely different from the black made desirable / the silver tone of the application object which compatibility with organic silver salt is bad when polymer, such as gelatin, polyvinyl alcohol, and a water-soluble polyacetal, is used as a binder, and is equal to practical use on application **** not only not being obtained but the development section / originally, and yellow, and] value / was obtained.

[0010] the photosensitive silver-halide particle used for heat developing sensitive material at the Europe patent No. 762,196, JP,9-90550,A, etc. -- the -- a hydrazine derivative is contained in making metal ion or metal complex ion of a VII group or a VIII group (seven to 10 group) contain, and sensitive material -- making -- high -- it is indicated that a contrast photograph property

can be acquired however -- if ***** like the binder used with the application liquid of the above-mentioned aqueous intermediation and a hydrazine is used together -- high -- although the contrast picture could be acquired, it was easy to produce fogging simultaneously and there was a problem that elevation of fogging at the time of preservation was large, especially [0011] Then, fogging was low, Dmax (the highest concentration) was able to acquire a picture with little elevation of fogging at the time of preservation highly, and technology of offering an advantageous heat developing sensitive material in respect of environment and cost was desired.

[0012]

[Problem(s) to be Solved by the Invention] Therefore, as the object for photoengraving process especially a scanner, and an object for imagesetters, especially the first technical problem that is going to solve this invention has low fogging, and is to offer heat developing sensitive material with Dmax (the highest concentration) able to acquire a picture with little elevation of fogging at the time of preservation highly. Furthermore, the second technical problem which is going to solve this invention is to offer the heat developing sensitive material in which an advantageous drainage system application is possible in respect of environment and cost.

[0013]

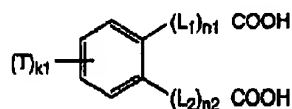
[Means for Solving the Problem] This technical problem was attained by the following means.

(1) In the heat developing sensitive material which has nonphotosensitivity silver salt, a photosensitive silver halide, and a binder on a base material The latex of -30-degree-C or more glass transition temperature [40 degree-C or less] polymer is used as 50% of the weight or more of the binder of the image formation layer containing nonphotosensitivity silver salt and a photosensitive silver halide. And heat developing sensitive material which has a kind and ***** for the organic-acid compound expressed with the following formula (A) to the side which has an image formation layer at least, and is characterized by the film surface pH by the side of an image formation layer being six or less.

[0014]

[Formula 4]

式 (A)



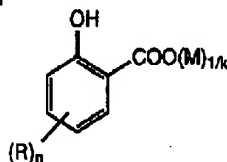
[0015] T expresses a univalent substituent among [formula (A)], and k1 expresses or more 0 four or less integer. It expresses that the whole of k1=0 is a hydrogen atom, and in the case of k1 >=2, it may differ, even if the same, and it may join together mutually, and two or more T may form the ring, respectively. L1 and L2 express a connection machine. n1 and n2 express or more 0 30 or less integer.]

(2) Heat developing sensitive material of the above (1) which ***** at least the compound further expressed with the following formula (B) to the side which has an image formation layer.

[0016]

[Formula 5]

式 (B)



[0017] M expresses the cation of a hydrogen atom or k ** among [formula (B)], and k expresses one or more integers. R expresses a substituent, n is the integer of 1-4, it may differ, even if the same, and it may join together mutually, and R of case plurality of n >=2 may form the ring.]

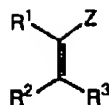
(3) The above (1) which uses ammonia for regulation of a film surface pH at least, or (2) heat developing sensitive material.

(4) One heat developing sensitive material of above-mentioned (1) - (3) which is a kind of compound chosen from the substitution alkene derivative by which ***** is expressed with the following formula (1), the substitution isoxazole derivative expressed with the following formula (2), and the specific acetal compound expressed with the following formula (3) at least.

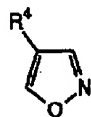
[0018]

[Formula 6]

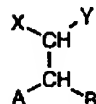
式 (1)



式 (2)



式 (3)



[0019] In [formula (1), R1, R2, and R3 express a hydrogen atom or a substituent independently, respectively, and Z expresses an electronic suction nature machine or a silyl machine. In a formula (1), it may join together mutually, respectively and R2, R3, R1 and R2, and R3 and Z may form the cyclic structure. [R1, Z,] In a formula (2), R4 expresses a substituent. In a formula (3), X and Y express a hydrogen atom or a substituent independently, respectively, and A and B express an alkoxy group, an alkyl thio machine, an alkylamino machine, an aryloxy group, an aryl thio machine, the Ernie Reno machine, a heterocycle oxy-basis, a heterocycle thio machine, or the heterocycle amino group independently, respectively. In a formula (3), it may join together mutually, respectively and X, Y, and A and B may form the cyclic structure.]

[0020]

[Embodiments of the Invention] this invention is explained in detail below. The latex of -30-degree-C or more glass transition temperature [which makes possible as a main binder of the image formation layer containing nonphotosensitivity silver salt and a photosensitive silver halide the advantageous drainage system application of a good photograph performance in respect of environment and cost possible as for the heat developing sensitive material of this invention / 40 degree-C or less] polymer is used. In such a sensitive material, by making the organic-acid compound and ***** which are expressed with a formula (A) contain, and making the film surface pH by the side of an image formation layer or less into 6.0, the performance as a high-contrast sensitized material becomes good, and change of the performance by preservation can be prevented. such an effect uses together further the compound formula (B) come out of and expressed, and improves by using ammonia as alkali chemicals for regulation of a film surface pH

[0021] Although the organic silver salt which can be used for this invention as nonphotosensitivity silver salt was comparatively stable, when it is heated more than 80 degrees C or it to light under the exposed photocatalyst and existence (latent image of a photosensitive silver halide etc.) of a reducing agent, it is silver salt which forms a silver picture. Organic silver salt may be arbitrary organic substances including the source which can return a complex ion. The silver salt of an organic acid, especially the silver salt of a long-chain fat carboxylic acid (a carbon number 10-30, preferably 15-28) are desirable. The complex of organic which has the complex stability constant of the range of 4.0-10.0], or inorganic silver salt also has a desirable ligand. Silver feed materials can constitute about 5 - 70% of the weight of an image formation layer preferably. Desirable organic silver salt contains the silver salt of the organic compound which has a carboxyl group. Although these examples contain the silver salt of an aliphatic carboxylic acid, and the silver salt of an aromatic carboxylic acid, they are not limited to these. As a desirable example of the silver salt of an aliphatic carboxylic acid, behenic acid silver, arachidic-acid silver, stearin acid silver, oleic acid silver, lauric-acid silver, caproic-acid silver, myristic-acid silver, palmitic-acid silver, maleic-acid silver, fumaric-acid silver, tartaric-acid silver, linolic acid silver, butanoic acid silver and camphoric-acid silver, such mixture, etc. are included.

[0022] In this invention, also in the mixture of the organic-acid silver mentioned above or organic-acid silver, it is desirable to use the organic-acid silver beyond behenic acid silver content 85 mol %, and more than 95 mol % is still more desirable. Behenic acid silver content shows the mole fraction of the behenic acid silver to the organic-acid silver to be used here. The object mentioned above as organic-acid silver other than the behenic acid silver contained in the organic-acid silver used for this invention can be used preferably.

[0023] The organic-acid silver preferably used for this invention is prepared by making the alkali-metal salt (Na salt, K salt, Li salt, etc. being mentioned) solution or the suspension, and the silver nitrate of the organic acid shown above react. The organic-acid alkali-metal salt of this invention is obtained by carrying out the alkali treatment of the above-mentioned organic acid. The organic-acid silver of this invention is a palindrome formula in arbitrary suitable containers, or continuous system can perform it. Churning in a reaction container can be agitated by the arbitrary churning methods with the property that a particle is required. as the method of preparation of organic-acid silver, it is in the reaction container containing organic-acid alkali-metal salting-in liquid or suspension gradually about silver-nitrate solution -- it is -- the method of adding rapidly -- it is in the reaction container containing silver-nitrate solution gradually about the organic-acid alkali-metal salting-in liquid or suspension prepared beforehand -- it is -- the method of adding rapidly -- any of the method of adding simultaneously the silver-nitrate solution and organic-acid alkali-metal salting-in liquid which were prepared beforehand, or suspension in a reaction container -- although -- it can use preferably

[0024] Silver-nitrate solution and organic-acid alkali-metal salting-in liquid, or suspension can use the object of concentration

arbitrary for control of the grain size of the organic-acid silver to prepare, and can add it at arbitrary addition speed. As the addition method of silver-nitrate solution and organic-acid alkali-metal salting-in liquid, or suspension, it can add in the method of adding by addition speed regularity, the acceleration addition method by arbitrary time functions, or a slowdown addition method. Moreover, to reaction mixture, you may add on an oil level and may add in liquid. Although either silver-nitrate solution, organic-acid alkali-metal salting-in liquid or suspension can be made to be able to precede in the case of the method of adding simultaneously the silver-nitrate solution and organic-acid alkali-metal salting-in liquid which were prepared beforehand, or suspension in a reaction container and it can also add in it, it is desirable to make silver-nitrate solution precede and to add. As a degree of precedence, 0 to 50vol(s)% of the total addition is desirable, and especially 0 to 25vol(s)% is desirable. Moreover, the method of adding, while controlling pH or silver potential of reaction mixture in a reaction like a publication to JP,9-127643,A etc. can also be used preferably.

[0025] Silver-nitrate solution, and the organic-acid alkali-metal salting-in liquid or suspension added can adjust pH with the property that a particle is required. Acids and alkali arbitrary for pH adjustment can be added. Moreover, although the temperature in a reaction container can be arbitrarily set up with the property that a particle is required, because of control of the grain size of the organic-acid silver adjusted, for example, silver-nitrate solution, and the organic-acid alkali-metal salting-in liquid or suspension added can also be adjusted to arbitrary temperature. In order to secure the fluidity of liquid, as for organic-acid alkali-metal salting-in liquid or suspension, it is desirable at 50 degrees C or more to carry out heating keeping warm.

[0026] As for the organic-acid silver used for this invention, being prepared under existence of the 3rd alcohol is desirable. A 15 or less total-carbon number object is preferably [as the 3rd alcohol] desirable, and ten especially or less are desirable. As an example of the 3rd desirable alcohol, although a tert-butanol etc. is mentioned, this invention is not limited to this.

[0027] Although which timing at the time of organic-acid silver adjustment is sufficient as the addition stage of the 3rd alcohol used for this invention, it is desirable to add at the time of manufacture of an organic-acid alkali-metal salt, and to dissolve and use an organic-acid alkali-metal salt. Moreover, although the amount of the 3rd alcohol used of this invention can be arbitrarily used in 0.01-10 by the weight ratio to H₂O as a solvent at the time of organic-acid silver manufacture, the range of 0.03-1 is desirable.

[0028] Although there is especially no limit as a configuration of the organic silver salt which can be used for this invention, the needle crystal which has a minor axis and a major axis is desirable. In this invention, 0.20 micrometers or less of minor axes 0.01 micrometers or more and 5.0 micrometers or less of 0.10-micrometer or more major axes are desirable, and 0.15 micrometers or less of minor axes 0.01 micrometers or more and 4.0 micrometers or less of 0.10-micrometer or more major axes are more desirable. As for the grain-size distribution of organic silver salt, it is desirable that it is mono dispersion. 100 molar fractions of a value which broke the standard deviation of the length of a minor axis and each major axis by the minor axis and each major axis are desirable, and mono dispersion is 50% or less still more preferably 80% or less more preferably 100% or less. As a measuring method of the configuration of organic silver salt, it can ask from the transmission-electron-microscope image of an organic silver salt distribution object. The percentage (coefficient of variation) of the value which there is a method of asking for the standard deviation of the volume weighted average diameter of organic silver salt as an option which measures mono dispersion nature, and was broken by the volume weighted average diameter is 50% or less still more preferably 80% or less more preferably 100% or less. A laser beam is irradiated at the organic silver salt distributed for example, in liquid as a measuring method, and it can ask from the grain size (volume weighted average diameter) obtained by searching for the autocorrelation function over time change of fluctuation of the scattered light.

[0029] Organic silver salt which can be used for this invention can be desalted preferably. Although there is especially no limit as a method of desalting and a well-known method can be used, the well-known filtration methods, such as flocculation rinsing by centrifugal filtration, suction filtration, the ultrafiltration, and the condensation method, can be used preferably.

[0030] It is desirable to use the variational method which carries out a pressure drawdown at this invention, after changing the water dispersion which does not contain photosensitive silver salt substantially, including the organic silver salt which is an image formation medium in order to obtain the organic silver salt solid-state distribution object which whose grain size is small at high S/N, and does not have condensation in the style of high speed.

[0031] And after passing through such a process, it mixes with photosensitive silver salt solution, and photosensitive image formation medium application liquid is manufactured. If heat developing sensitive material is produced using such application liquid, Hayes will be low and the heat developing sensitive material of high sensitivity will be obtained by low fogging. On the other hand, if it changes high pressure and in the style of high speed, and photosensitive silver salt is made to live together when distributing, fogging will go up and sensitivity will fall remarkably. Moreover, if not water but the organic solvent is used as a dispersion medium, Hayes will become high, fogging will go up and it will become easy for sensitivity to fall. On the other hand, it changes to the method of mixing photosensitive silver salt solution, and if the conversion method for changing a part of organic silver salt in distributed liquid into photosensitive silver salt is used, sensitivity will fall.

[0032] In the above, the water dispersion distributed by changing into high pressure and improvement in the speed is less than 0.1 mol %] to the organic silver salt of nonphotosensitivity [content / the] excluding photosensitive silver salt substantially, and addition of positive photosensitive silver salt is not performed.

[0033] About the solid-state distribution equipment used for enforcing the above variational methods in this invention, and its technology for example, "a dispersed-system rheology and decentralization technology" (Toshio in **, and Hiroki Usui work --) "1991, Shinzan Book Co., Ltd., Inc., p357-p403, and the 24th collection of progress of chemical engineering" (the volume on corporation Society of Chemical Engineers, Japan Tokai branch --) Although it is detailed to 1990, *****, p184-p185, etc., the

variational method in this invention After pressurizing the water distribution object which contains organic silver salt at least by high pressure pumping etc. and feeding in piping, it is the method of performing detailed distribution, by passing the narrow slit prepared in piping and making distributed liquid produce the rapid failure of pressure next.

[0034] The high-pressure homogenizer with which this invention is related is considered that distribution to a detailed particle is performed by dispersion force, such as "cavitation force" etc. produced in case "shearing force" and the (b) dispersoid which are generally produced in case the (a) dispersoid passes interval spare time at high pressure and high speed are released from under high pressure by the ordinary pressure. Although a gaulin homogenizer is mentioned in ancient times as this kind of distributed equipment, with this equipment, the distributed liquid sent by high pressure is a narrow gap on a pillar side, and is changed in the style of high speed, it collides with a surrounding wall surface with the vigor, and emulsification and distribution are performed by the impulse force. Generally, working pressure is 100 - 600 kg/cm², the rate of flow is the range of several m - 30m/second, in order to gather distributed efficiency, the high rate-of-flow section is made into the shape of a serrated knife, and what devised increasing the number of times of a collision etc. is devised. On the other hand, the equipment whose distribution by high pressure and the high rate of flow is recent years still attained is developed, and a Micro fluidizer (micro sieve DEKKUSU International corporation company), a nano mizer (special opportunity-sized Industry), etc. are mentioned as the example of representation.

[0035] as the distributed equipment suitable for this invention -- a micro sieve -- Micro fluidizer [by the DEKKUSU International corporation company] M-110 S-EH (with a G10Z interaction chamber), M-110Y (with an H10Z interaction chamber), M-140K (with a G10Z interaction chamber), HC-5000 (L30Z or with an H230Z interaction chamber), HC-8000 (E230Z or with an L30Z interaction chamber), etc. are mentioned

[0036] After pressurizing the water dispersion which contains organic silver salt at least by high pressure pumping etc. using these equipments and feeding in piping, it is possible by making distributed liquid produce a rapid pressure drawdown by impressing a desired pressure and returning the pressure in piping to atmospheric pressure quickly next etc. to obtain the optimal organic silver salt distribution object for this invention by passing the narrow slit prepared in piping.

[0037] It is desirable to carry out preliminary distribution of the raw material liquid in advance of distributed operation. A distributed means (for example, a high speed mixer, a homogenizer, a high-speed shock mill, a Banbury mixer, a homomixer, a kneader, a ball mill, a vibration ball mill, a planet ball mill, attritor, a sand mill, a bead mill, a colloid mill, a jet mill, a roller mill, a TRON mill, a high-speed stone mill) well-known as a means which carries out preliminary distribution can be used. It rough-distributes in a solvent by carrying out pH control, and pH may be changed and may be made to atomize under existence of a distributed assistant after that also besides distributing mechanically. At this time, an organic solvent may be used as a solvent used for rough distribution, and an organic solvent is usually removed after a atomization end.

[0038] Although it is possible in organic silver salt distribution of this invention to distribute to a desired grain size by the differential pressure at the time of the rate of flow and a pressure drawdown and regulation of the number of times of processing The rate of flow from a photograph property and the point of grain size 200m/second - 600m/second The range of 900 - 3000 kg/cm² has the desirable differential pressure at the time of a pressure drawdown, and it is still more desirable that the rate of flow is [the differential pressure at the time of 300m/second - 600m/ a second and / and a pressure drawdown] the range of 1500 - 3000 kg/cm². Although the number of times of distributed processing can be chosen if needed, and one - 10 times of the number of times of processing is usually chosen, one - about 3 times of the number of times of processing is chosen from the point of productivity. At an elevated temperature which exceeds 90 degrees C preferably from the point of dispersibility and a photograph property, making such a water dispersion into an elevated temperature under high pressure has the inclination for fogging to become high while grain size becomes easy to become large. Therefore, it is desirable still more desirable that the temperature of such moisture powder is maintained at the process before changing into the aforementioned high pressure and the high rate of flow in this invention, the processes after carrying out a pressure drawdown, or both these processes according to the cooling process by the range of 5-90 degrees C including a cooling process, and it is desirable the range of 5-80 degrees C and to be especially maintained at the range of 5-65 degrees C. Especially, at the time of high-pressure distribution of the range of 1500 - 3000 kg/cm², it is effective to install the aforementioned cooling process. A condensator can choose suitably what used the static mixer for the double pipe or the double pipe, a multitubuler heat exchanger, a coil heat exchanger, etc. according to the amount of necessary heat exchanges. Moreover, what is necessary is just to choose suitable things, such as a size, thickness, the quality of the material, etc. of a pipe, in consideration of working pressure, in order to gather the efficiency of a heat exchange. Refrigerants, such as -30-degree C ethylene glycol/water, can also be used for the refrigerant used for a condensator from the amount of heat exchanges the 5-10-degree C cold water processed with the 20-degree C well water or the refrigerator, and if needed.

[0039] distributed operation of this invention -- an aqosity solvent -- it is desirable to distribute organic silver salt under existence of a meltable dispersant (distributed assistant) As a distributed assistant, for example The copolymer of a polyacrylic acid and an acrylic acid, Synthetic anion polymer, such as a maleic-acid copolymer, a maleic-acid monoester copolymer, and an AKURIRO methyl propane sulfonic-acid copolymer, Semisynthesis anion polymer, such as a carboxymethyl starch and a carboxymethyl cellulose, Anionic polymer, such as an alginic acid and a pectic acid, a compound given in JP,7-350753,A, Or anionic [well-known], Nonion nature, polyvinyl alcohol of a cation nature surfactant or others, Although the high molecular compound which exists in natures, such as well-known polymer, such as a polyvinyl pyrrolidone, a carboxymethyl cellulose, hydroxypropylcellulose, and hydroxypropyl methylcellulose, or gelatin, can be chosen suitably and can be used Polyvinyl alcohol and especially a water-soluble cellulosic are desirable.

[0040] Although a distributed assistant is common practice, mixing with the powder of organic silver salt or the organic silver

salt of a wet cake state before distribution, and sending into a disperser as a slurry performs heat treatment and processing by the solvent, where organic silver salt is mixed beforehand, and it is good also as organic silver salt powder or a wet cake. You may carry out pH control by pH regulator suitable before and after distribution or during distribution.

[0041] It rough-distributes in a solvent by carrying out pH control, and pH may be changed and may be made to atomize under existence of a distributed assistant after that also besides distributing mechanically. At this time, an organic solvent may be used as a solvent used for rough distribution, and an organic solvent is usually removed after a atomization end.

[0042] The prepared distributed object can be saved, stirring in order to suppress sedimentation of the particle at the time of preservation, or can also be saved by the hydrophilic colloid in the viscous high state (for example, state made into the shape of jelly using gelatin). Moreover, antiseptics can also be added in order to prevent propagation of the various germs at the time of preservation etc.

[0043] The grain size (volume weighted average diameter) of the organic silver salt solid-state particle distribution object of this invention irradiates a laser beam at the solid-state particle distribution object distributed for example, in liquid, and it can ask for it from the grain size (volume weighted average diameter) obtained by searching for the autocorrelation function over time change of fluctuation of the scattered light. An average grain size [0.05 micrometer or more / 10.0 micrometer or less] solid-state particle distribution object is desirable. It is 2.0 micrometers or less of average 0.1-micrometer or more grain size still more preferably more preferably average 0.1-micrometer or more grain size [5.0 micrometer or less].

[0044] As for the grain-size distribution of organic silver salt, it is desirable that it is mono dispersion. Specifically, the percentage (coefficient of variation) of the value which broke the standard deviation of a volume weighted-mean diameter by the volume weighted average diameter is 30% or less still more preferably 50% or less more preferably 80% or less.

[0045] As a measuring method of the configuration of organic silver salt, it can ask from the transmission-electron-microscope image of an organic silver salt distribution object.

[0046] The organic silver salt solid-state particle distribution object used for this invention consists of organic silver salt and water at least. Although especially the rate of organic silver salt and water is not limited, as for the rate for which it accounts to the organic whole silver salt, it is desirable that it is 5 - 50 % of the weight, and it is especially desirable. [of 10 - 30% of the weight of the range] Although it is desirable to use the above-mentioned distributed assistant, it is desirable to carry out the minimum amount use of the grain size in the range suitable for making it the minimum, and 3 - 15% of the weight of the range is especially desirable one to 30% of the weight to organic silver salt.

[0047] although it is possible to mix an organic silver salt water dispersion and a photosensitive silver salt water dispersion in this invention, and to manufacture sensitive material -- the mixing ratio of organic silver salt and photosensitive silver salt -- the rate of photosensitive silver salt [as opposed to / although a rate can be chosen according to the purpose / organic silver salt] -- the 1-30-mol range of % -- desirable -- further 3-20-mol % -- the 5-15-mol range of % is especially desirable Mixing two or more sorts of organic silver salt water dispersions and two or more sorts of photosensitive silver salt water dispersions, in case it mixes is a method used preferably because of regulation of a photograph property.

[0048] Although the organic silver salt of this invention can be used in a desired amount, 0.1 - 5 g/m² is 1 - 3 g/m² desirable still more preferably as a silver content.

[0049] It is desirable to add the metal ion chosen from calcium, Mg, Zn, and Ag to nonphotosensitivity organic silver salt to this invention. About the addition to the nonphotosensitivity organic silver salt of the metal ion chosen from calcium, Mg, Zn, and Ag, it is desirable to add in the form of the water-soluble metal salt which is not a halogenide, and specifically adding in the form of a nitrate, a sulfate, etc. is desirable. Since the addition by the halogenide worsens the picture shelf life by the light (indoor light, sunlight, etc.) of the sensitive material after processing, and the so-called print-out nature, it is not desirable. For this reason, it is desirable to add in this invention in the form of the water-soluble metal salt which is not the above-mentioned halogenide.

[0050] As an addition stage of the metal ion chosen from calcium, Mg, Zn, and Ag which are preferably used for this invention, if it is just before [such as immediately after the particle formation after particle formation of this nonphotosensitivity organic silver salt, before distribution, after distribution, and application liquid adjustment order,] an application, which stage is sufficient and it is after distribution and before and after application liquid adjustment preferably.

[0051] As an addition of the metal ion chosen from calcium, Mg, Zn, and Ag in this invention, 10-3 to ten - one mol per one mol of nonphotosensitivity organic silver is desirable, and 5x10⁻³ to 5xten - two mols are especially desirable.

[0052] As halogen composition, there is no photosensitive silver halide used for this invention, and, especially as for a limit, a silver chloride, a salt silver bromide, a silver bromide, iodine silver bromide, and a YOU salt silver bromide can be used for it. The distribution of the halogen composition in a particle may be uniform, and that from which halogen composition changed in the shape of a step may be used for it, or what changed continuously may be used for it. Moreover, the silver-halide particle which has a core/shell structure can be used preferably. as structure -- desirable -- 2-5-fold structure -- the core / shell particle of 2-4-fold structure can be used more preferably Moreover, the technology to which localization of the silver bromide is carried out can also be preferably used for the front face of a silver chloride or a salt silver-bromide particle.

[0053] In this industry, although the formation method of a photosensitive silver halide can use the method which is learned well, for example, is indicated by No. 17029 and U.S. Pat. No. 3,700,458 in Research Disclosure June, 1978, by specifically adding a silver supply compound and a halogen supply compound in gelatin or other polymer solutions, it prepares a photosensitive silver halide and uses the method of mixing with organic silver salt after that. It is desirable that it is small for the purpose which suppresses the nebula after image formation low, and the grain size of a photosensitive silver halide specifically has more preferably 0.02 micrometers or more still more preferably good 0.12 micrometers or less 0.01 micrometers or more 0.15

micrometers or less 0.20 micrometers or less. A grain size here means the length of ** of a silver-halide particle, when a silver-halide particle is the so-called normal ** of a cube or an octahedron. Moreover, when a silver-halide particle is a plate-like particle, the diameter when converting into **** of the projected area on the front face of main and this area is said. In addition, when it is not normal **, in the case of a spherical particle, a cylindrical particle, etc., the diameter when considering a sphere equivalent to the volume of a silver-halide particle is said.

[0054] Although a cube, octahedron, plate-like particle, spherical particle, cylindrical particle, and potato-like particle etc. can be mentioned as a configuration of a silver-halide particle, especially in this invention, a cube-like particle and a plate-like particle are desirable. the average aspect ratio in the case of using a plate-like silver-halide particle -- desirable -- 100:1-2:1 -- 50:1-3:1 are more preferably good Furthermore, the particle to which the corner of a silver-halide particle was round can also be used preferably. Although there is especially no limit about the indices of crystal plane (Miller indices) of the outside surface of a photosensitive silver-halide particle, it is desirable that the rate for which the {100} sides where spectral sensitization efficiency when spectral sensitization coloring matter adsorbs is high account is high. As the rate, 50% or more is desirable, 65% or more is more desirable, and 80% or more is still more desirable. T.Tani;J.Imaging Sci. using the adsorption dependency of the {111} sides and {100} sides in adsorption of a sensitizing dye and 29,165 (1985) can be asked for the ratio of a Miller-indices {100} side by the method of a publication.

[0055] the photosensitive silver-halide particle of this invention -- the [of a periodic table] -- the [a VII group or] -- a VIII group's (seven to 10 group) metal or metal complex is contained the [of a periodic table] -- the [a VII group or] -- they are a rhodium, a rhenium, a ruthenium, male NIUMU, and iridium preferably as a VIII group's metal, or a central metal of a metal complex The number of these metal complexes one, and they may use together two or more sorts of complexes of an of-the-same-kind metal and a dissimilar metal. Desirable content has the desirable range of 1xten - nine to 1xten - three mols to one mol of silver, and its range of 1xten - eight to 1xten - four mols is more desirable. The metal complex of the structure indicated by JP,7-225449,A etc. as structure of a concrete metal complex can be used.

[0056] A water-soluble rhodium compound can be used as a rhodium compound used for this invention. For example, a halogenation rhodium (III) compound or the thing which has a halogen, amines, oxalato, etc. as a ligand by rhodium complex salt, for example, hexa chloro rhodium (III) complex salt, pen TAKUROROAKO rhodium (III) complex salt, tetrapod chloro JIAKO rhodium (III) complex salt, hexa BUROMO rhodium (III) complex salt, hexa ammine rhodium (III) complex salt, trio KIZARATO rhodium (III) complex salt, etc. are mentioned. Although dissolved and used for water or a suitable solvent, the method of adding the method (for example, a hydrochloric acid, bromate, fluoric acid, etc.) generally performed often, i.e., hydrogen-halide solution, and alkali halides (for example, KCl, NaCl, KBr, NaBr, etc.) can be used for these rhodium compounds in order to stabilize the solution of a rhodium compound. It is possible to add another silver-halide particle which has doped the rhodium beforehand, and to also make it dissolve at the time of silver-halide manufacture instead of using a water-soluble rhodium.

[0057] The range of 1xten - eight mols - 5xten - four mols per one mol of silver halides is desirable especially desirable, and the addition of these rhodium compounds is 5xten - eight mols - 1xten - five mols.

[0058] Although addition of these compounds can be suitably performed in each stage before applying the time of manufacture of a silver-halide emulsion particle, and an emulsion, it is desirable to add especially at the time of emulsion formation, and to be incorporated into a silver-halide particle.

[0059] The rhenium used for this invention, a ruthenium, and an osmium are added in the form of the water-soluble complex salt indicated by JP,63-2042,A, JP,1-285941,A, 2-20852, 2-20855, etc. The sixcoordinate complex especially shown by the following formulas as a desirable thing is mentioned.

[ML6] n - M expresses Ru, Re, or Os here, L expresses a ligand, and n expresses 0, 1, 2, 3, or 4.

[0060] In this case, a counter ion does not have importance but ammonium or alkali-metal ion is used.

[0061] Moreover, as a desirable ligand, a halogenide ligand, a cyanide ligand, a cyanic-acid ghost ligand, a nitrosyl ligand, a thio nitrosyl ligand, etc. are mentioned. Although the example of the concrete complex used for this invention below is shown, this invention is not limited to this.

[0062]

[ReCl6]3- [ReBr6]3- [ReCl5(NO)]2- [Re(NS)Br5]2- [Re(NO)(CN)5]2- [Re(O)2(CN)4]3- [RuCl6]3- [RuCl4(H2O)2]- [RuCl5(H2O)]2- [RuCl5(NO)]2- [RuBr5(NS)]2- [Ru(CO)3Cl3]2- [Ru(CO)Cl5]2- [Ru(CO)Br5]2- [OsCl6]3- [OsCl5(NO)]2- [Os(NO) (CN)5]2- [Os(NS) Br5]2- [Os(O)2(CN)4]4-[0063] The range of 1xten - nine mols - 1xten - four mols per one mol of silver halides is desirable especially desirable, and the addition of these compounds is 1xten - eight mols - 1xten - five mols.

[0064] Although addition of these compounds can be suitably performed in each stage before applying the time of manufacture of a silver-halide emulsion particle, and an emulsion, it is desirable to add especially at the time of emulsion formation, and to be incorporated into a silver-halide particle.

[0065] In order to add these compounds during particle formation of a silver halide and to incorporate into a silver-halide particle The solution which dissolved together with the powder of a metal complex or NaCl, and KCl How to add in the water-soluble salt under particle formation, or the water-soluble halide solution, Or when a halide solution is simultaneously mixed with silver salt, it adds as the 3rd solution, and there is a method of preparing a silver-halide particle by the method of 3 liquid simultaneous mixture or the method of supplying the solution of the metal complex of an initial complement to a reaction container during particle formation. The method of adding the solution which dissolved together with especially powder or NaCl, and KCl in a water-soluble halide solution is desirable.

[0066] In order to add on a particle front face, the solution of the metal complex of an initial complement can also be supplied to a reaction container at the time in the middle of the time of physical digestion immediately after particle formation of an end or chemical ripening.

[0067] Although various things can be used as an iridium compound used by this invention, hexa chloro iridium, hexa ammine iridium, trio KIZARATO iridium, hexa cyano iridium, PENTA chloro nitrosyl iridium, etc. are mentioned, for example. Although dissolved and used for water or a suitable solvent, the method of adding the method (for example, a hydrochloric acid, bromate, fluoric acid, etc.) generally performed often, i.e., hydrogen-halide solution, and alkali halides (for example, KCl, NaCl, KBr, NaBr, etc.) can be used for these iridium compounds in order to stabilize the solution of an iridium compound. It is possible to add another silver-halide particle which has doped iridium beforehand, and to also make it dissolve at the time of silver-halide manufacture instead of using water-soluble iridium.

[0068] To the silver-halide particle furthermore used for this invention, you may contain metal atoms, such as cobalt, iron, nickel, chromium, palladium, platinum, gold, a thallium, copper, and lead. About the compound of a ruthenium, a 6 cyano metal complex can be preferably used for cobalt, iron, chromium, and a pan. As an example, although ferricyanic-acid ion, ferrocyanic-acid ion, hexa cyano cobalt acid ion, hexa cyano chromic-acid ion, hexa cyano ruthenium acid ion, etc. are mentioned, it is not limited to these. Even if it makes the metal complex in a silver halide contain uniformly, the core section may be made to contain in high concentration, or the shell section may be made to contain in high concentration, and there is especially no limit.

[0069] The above-mentioned metal has desirable 1×10^{-9} to 1×10^{-4} four mols per one mol of silver halides. moreover, the above-mentioned metal is contained -- making -- it can be made the metal salt of the form of a simple salt, double salt, or complex salt, and can add at the time of particle manufacture

[0070] Although the noodle method, the flocculation method, etc. can be desalted by rinsing of the method learned for this industry, even if a photosensitive silver-halide particle desalts them in this invention, it is not necessary to carry out it.

[0071] As a gold sensitization agent used when giving gold sensitization to the silver-halide emulsion of this invention, + univalent or + trivalent are sufficient as the golden oxidation number, and the gold compound usually used as a gold sensitization agent can be used. As a typical example, a chloroauric acid, a potassium clo ROO rate, auric trichloride, potassium Auric thiocyanate, a potassium yaw DOO rate, tetracyano ORIKKU acid, ammonium aurothiocyanate, pyridyltrichlorogold, etc. are mentioned.

[0072] Although the addition of a gold sensitization agent changes with various conditions, as a standard, ten - seven mols or more per one mol of silver halides ten - three mols or less are 5×10 to four or less [ten - six mols or more] more preferably.

[0073] As for the silver-halide emulsion of this invention, it is desirable to use together gold sensitization and other chemical sensitization. As the method of other chemical sensitization, methods learned, such as a sulfur sensitization method, a selenium sensitization method, a tellurium sensitization method, and a noble-metals sensitization method, can be used. When using it combining a gold sensitization method, for example, a sulfur sensitization method, a gold sensitization method and a selenium sensitization method, a gold sensitization method and a sulfur sensitization method, a selenium sensitization method, a gold sensitization method and a sulfur sensitization method, a tellurium sensitization method, a gold sensitization method and a sulfur sensitization method, a selenium sensitization method, a tellurium sensitization method, a gold sensitization method, etc. are desirable.

[0074] Usually, the sulfur sensitization preferably used for this invention adds a sulfur sensitization agent, and is performed by carrying out fixed time churning of the emulsion at the elevated temperature of 40 degrees C or more. Thiourea, others and various sulfur compounds, for example, a thiosulfate, thiazoles, and rhodanine can be used. [sulfur compound / which can use a compound well-known as a sulfur sensitization agent, for example is contained in gelatin] Desirable sulfur compounds are a thiosulfate and a thiourea compound. Although the addition of a sulfur sensitization agent changes under various conditions, such as a size of pH at the time of chemical ripening, temperature, and a silver-halide particle, it is 10^{-7} to ten - two mols per one mol of silver halides, and is 10^{-5} to ten - three mols more preferably.

[0075] A well-known selenium compound can be used as a selenium sensitizer used for this invention. That is, it is carried out by adding an unstable type and/or an un-unstable type selenium compound, and usually, carrying out fixed time churning of the emulsion at the elevated temperature of 40 degrees C or more. The compound of a publication can be used for JP,44-15748,B, 43-13489, JP,4-25832,A, 4-109240, 4-324855, etc. as an unstable type selenium compound. It is especially a general formula (VIII) in JP,4-324855,A. And it is desirable to use the compound shown by (IX).

[0076] It is the compound which makes the tellurium-ized silver presumed that the tellurium sensitizer used for this invention becomes a sensitization nucleus to a silver-halide particle front face or the interior generate. About the tellurium-ized silver generation rate in a silver-halide emulsion, it can examine by the method of a publication to JP,5-313284,A. As a tellurium sensitizer, for example, diacyl telluride and screw (oxy-carbonyl) telluride, Screw (carbamoyl) telluride, diacyl telluride, a bis(oxy carbonyl)ditelluride group, A bis(carbamoyl)ditelluride group, the compound which has P=Te combination, TERURO carboxylates, Te-organil tellurocarboxylic-ester, JI (poly) telluride, telluride, TERURORU, TERURO acetals, a tellurosulfonate group, the compound that has P-Te combination, ** Te heterocycles, a TERURO carbonyl compound, an inorganic tellurium compound, a colloid tellurium, etc. can be used. Specifically U.S. Pat. No. 1,623,499, 3,320,069, 3,772,031, the British patent No. 235,211, 1,121,496, 1,295,462, 1,396,696, the Canada patent No. 800,958, JP,4-204640,A, Japanese Patent Application No. No. 53693 [three], 3-131598, 4-129787 and the journal OBU chemical SOSAIA tea chemical communication 635 (1980) (J. Chem.Soc.Chem. Commun.), ibid 1102 (1979) ibid 645 (1979), The journal OBU chemical SOSAIA tea Perkin transaction (J. Chem.Soc.Perkin. Trans.) 1 and 2191 (1980), S. Volume [on PATAI (S. Patai)], and THE chemistry OBU

organic selenium -, and - tellurium contribution UNZU (The Chemistry of Organic Selenium and Tellurium Compounds), Vol. 1 (1986), ** The compound of a publication can be used for Vol.2 (1987). The general formula (II) which is especially among JP,5-313284,A, (III), and (IV) The compound shown is desirable.

[0077] Although the amount of the selenium used by this invention and the tellurium sensitizer used changes according to a silver-halide particle, chemical-ripening conditions, etc. to be used, generally 10⁻⁸ to ten⁻² mol [per one mol of silver halides] about 10⁻⁷ to ten⁻³ mol are preferably used for it. although there is especially no limit as conditions for the chemical sensitization in this invention -- as pH -- as 5-8, and pAg -- 6-11 -- it is 7-10 preferably and 40-95 degrees C is 45-85 degrees C preferably as temperature

[0078] You may make cadmium salt, a sulfite, lead salt, thallium salt, etc. live together in the process of formation of a silver-halide particle, or physical digestion in the silver-halide emulsion used for this invention.

[0079] Reduction sensitization can be used in this invention. As a concrete compound of a reduction sensitization method, a stannous chloride, an aminoiminomethanesulfonic acid, a hydrazine derivative, a borane compound, a silane compound, a polyamine compound, etc. can be used other than ascorbic-acid and diacid-ized thiourea. Moreover, reduction sensitization of the pH of an emulsion can be carried out by holding and riping 7 or more and pAg or less to 8.3. Moreover, reduction sensitization can be carried out by introducing the single addition part of a complex ion during particle formation.

[0080] The silver-halide emulsion of this invention may add a thiosulfonic acid compound by the method shown in the Europe public presentation patent EP No. 293,917.

[0081] the silver-halide emulsion in the sensitive material used for this invention -- a kind -- good -- you may carry out and carry out two or more (for example, that [from which average grain size differs], thing [from which halogen composition differs], thing [from which crystal habit differs], thing from which conditions of chemical sensitization differ) sort combined use

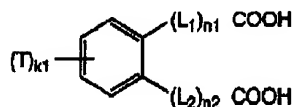
[0082] As amount of the photosensitive silver halide used of this invention, 0.5 mols or less of photosensitive 0.01-mol or more silver halides are desirable to one mol of organic silver salt, 0.02 mols or more 0.3 mols or less are more desirable, and 0.03 mols or more especially 0.25 mols or less are desirable. About the mixed method of a photosensitive silver halide and organic silver salt and the mixed conditions which were prepared separately The silver-halide particle and the organic silver salt which carried out the manufacture end, respectively A high-speed agitator and a ball mill, the method of mixing with a sand mill, a colloid mill, a vibration mill, a homogenizer, etc. -- or, although there is a method of mixing the photosensitive silver halide which carried out the manufacture end to the timing of either of manufacture of organic silver salt, and preparing organic silver salt etc. Book

[0083] The heat developing sensitive material of this invention carries out kind content of the organic-acid compound expressed with the layer of the side which has an image formation layer by the following formula (A) at least.

[0084]

[Formula 7]

式 (A)



[0085] T expresses a univalent substituent among a formula (A), and k1 expresses or more 0 four or less integer. It expresses that the whole of k1=0 is a hydrogen atom, and in the case of k1 >=2, it may differ, even if the same, and it may join together mutually, and two or more T may form the ring, respectively. When two or more T does not form the ring mutually, as for k1, 0, 1, or 2 are desirable, and 0 or especially 1 are desirable.

[0086] as the univalent substituent expressed with T -- an alkyl group (they are carbon numbers 1-8 especially preferably desirable -- carbon numbers 1-20 -- more -- desirable -- carbon numbers 1-12 --) for example, a methyl, ethyl, n-propyl, an iso-propyl, n1 butyl, iso-butyl, tert-butyl, n-octyl, n-desyl, n-hexadecyl, a cyclo propyl, cyclopentyl, cyclohexyl, etc. are mentioned an alkenyl machine (they are carbon numbers 2-8 especially preferably desirable -- carbon numbers 2-20 -- more -- desirable -- carbon numbers 2-12 --) for example, a vinyl, an allyl compound, 2-butenyl, 3-pentenyl, etc. are mentioned an alkynyl group (especially, it is 2-8 preferably, for example, propargyl, 3-bench nil, etc. are mentioned. desirable -- carbon numbers 2-20 -- more -- desirable -- 2-12 --) an aryl group (especially, it is carbon numbers 6-12 preferably, for example, a phenyl, p-methylphenyl, a naphthyl, etc. are mentioned. desirable -- carbon numbers 6-30 -- more -- desirable -- carbon numbers 6-20 --) the amino group (they are carbon numbers 0-6 especially preferably desirable -- carbon numbers 0-20 -- more -- desirable -- carbon numbers 0-10 --) for example, AMINO, methylamino, dimethylamino, diethylamino, dibenzylamino, etc. are mentioned an alkoxy group (especially, it is carbon numbers 1-8 preferably, for example, methoxy and ethoxy ** isopropoxy, butoxy one, etc. are mentioned. desirable -- carbon numbers 1-20 -- more -- desirable -- carbon numbers 1-12 --) an aryloxy group (they are carbon numbers 6-12 especially preferably desirable -- carbon numbers 6-20 -- more -- desirable -- carbon numbers 6-16 --) for example, phenyloxy, 2-naphthyloxy, etc. are mentioned an acyl group (especially, it is carbon numbers 1-12 preferably, for example, an acetyl, a benzoyl, the formyl, pivaloyl, etc. are mentioned. desirable -- carbon numbers 1-20 -- more -- desirable -- carbon numbers 1-16 --) an alkoxy carbonyl group (they are carbon numbers 2-12 especially preferably desirable -- carbon numbers 2-20 -- more -- desirable -- carbon numbers 2-16 --) for example, a methoxycarbonyl, ethoxycarbonyl, a tetradecyl oxy-carbonyl, etc. are mentioned an aryloxy carbonyl group (especially, it is carbon numbers 7-10 preferably, for example, a phenyloxy carbonyl etc. is mentioned. desirable -- carbon numbers 7-20 -- more -- desirable -- carbon numbers 7-16 --) an acyloxy machine (they are carbon numbers 2-10 especially preferably desirable -- carbon numbers 2-20 -- more -- desirable -- carbon numbers 2-16 --) for example, acetoxo, benzoyloxy one, etc. are mentioned the acylamino machine (especially, it is carbon numbers 2-10

preferably, for example, acetylamino, propionylamino, benzoylamino, etc. are mentioned. desirable -- carbon numbers 2-20 -- more -- desirable -- carbon numbers 2-16 --) an alkoxy carbonylamino machine (they are carbon numbers 2-12 especially preferably desirable -- carbon numbers 2-20 -- more -- desirable -- carbon numbers 2-16 --) for example, methoxycarbonylamino etc. is mentioned an aryloxy carbonylamino machine (especially, it is carbon numbers 7-12 preferably, for example, phenyloxy carbonylamino etc. is mentioned. desirable -- carbon numbers 7-20 -- more -- desirable -- carbon numbers 7-16 --) a sulfonylamino machine (they are carbon numbers 1-12 especially preferably desirable -- carbon numbers 1-20 -- more -- desirable -- carbon numbers 1-16 --) for example, methanesulfonylamino, octane sulfonylamino, benzenesulfonyl amino, etc. are mentioned a sulfamoyl group (especially, it is carbon numbers 0-12 preferably, for example, sulfamoyl, methyl sulfamoyl, dimethyl sulfamoyl, phenyl sulfamoyl, etc. are mentioned. desirable -- carbon numbers 0-20 -- more -- desirable -- carbon numbers 0-16 --) a carbamoyl group (they are carbon numbers 1-12 especially preferably desirable -- carbon numbers 1-20 -- more -- desirable -- carbon numbers 1-16 --) for example, a carbamoyl, a methyl carbamoyl, diethylcarbamoyl, phenylcarbamoyl, etc. are mentioned an alkyl thio machine (especially, it is carbon numbers 1-12 preferably, for example, a methylthio, an ethyl thio, etc. are mentioned. desirable -- carbon numbers 1-20 -- more -- desirable -- carbon numbers 1-16 --) an aryl thio machine (they are carbon numbers 6-12 especially preferably desirable -- carbon numbers 6-20 -- more -- desirable -- carbon numbers 6-16 --) for example, phenylthio etc. is mentioned a sulfonyl machine (especially, it is carbon numbers 1-12 preferably, for example, a mesyl, a tosyl, etc. are mentioned. desirable -- carbon numbers 1-20 -- more -- desirable -- carbon numbers 1-16 --) a sulfinyl machine (especially, it is carbon numbers 1-12 preferably, for example, a methane sulfinyl, a benzene sulfinyl, etc. are mentioned. desirable -- carbon numbers 1-20 -- more -- desirable -- carbon numbers 1-16 --) a ureido machine (they are carbon numbers 1-12 especially preferably desirable -- carbon numbers 1-20 -- more -- desirable -- carbon numbers 1-16 --) for example, a ureido, a methyl ureido, a phenyl ureido, etc. are mentioned a phosphoric-acid amide group (especially, it is carbon numbers 1-12 preferably, for example, a diethyl phosphoric-acid amide, a phenyl phosphoric-acid amide, etc. are mentioned. desirable -- carbon numbers 1-20 -- more -- desirable -- carbon numbers 1-16 --) A hydroxy group, a cull POKISHIRU machine, a sulfonic group, a SURUFINO machine (sulfinic-acid machine), A sulfhydryl group, a halogen atom (for example, a fluorine atom, a chlorine atom, a bromine atom, an iodine atom), a cyano group, a nitro group, a hydroxamic-acid machine, a hydrazino machine, a heterocycle machine (for example, imidazolyl, pyridyl, a furil, PI ** RIJIRU, morpholino, etc. are mentioned.) etc. -- it is mentioned Moreover, as an example in which two or more T joins together mutually, and forms the ring, although what known condensed ring phthalic acid can also be used, as a desirable example, [3, 4] BENZO, [4, 5] BENZO, [4, 5] naphth, [3, 4] methylene dioxy (namely, JOKISORO), [4, 5] methylene dioxy, etc. can be mentioned. Moreover, the substituent in which salt formation with alkali metal etc. is possible may form the salt. These substituents or condensed rings may be replaced further. moreover, in a certain case, even if two or more substituents are the same, they may differ

[0087] Preferably as a substituent expressed with T An alkyl group, an alkenyl machine, an aryl group, An alkoxy group, an aryloxy group, an acyl group, an acyloxy machine, an alkoxy carbonyl group, The acylamino machine, an alkoxy carbonylamino machine, an aryloxy carbonylamino machine, A sulfonylamino machine, a sulfamoyl group, a carbamoyl group, a ureido machine, A phosphoric-acid amide group, a hydroxy group, a cull POKISHIRU machine, a sulfonic group, a SURUFINO machine, BENZO a sulfonyl machine, a halogen atom, a cyano group, and a nitro group -- passing -- a terrorism ring machine, and [3, 4] -- [4, 5] BENZO, [4, 5] naphth, [3, 4] methylene dioxy, It is [4, 5] methylene dioxy. still more preferably An alkyl group, an aryl group, An alkoxy group, an aryloxy group, an acyl group, the acylamino machine, a sulfonylamino machine, A sulfamoyl group, a carbamoyl group, a hydroxy group, a sulfonyl machine, a halogen atom and a cyano group -- it is -- [3, 4] BENZO, [4, 5] BENZO, [3, 4] methylene dioxy, and [4, 5] methylene dioxy -- they are an alkyl group, an aryl group, an alkoxy group, [4, 5] BENZO, and [4, 5] methylene dioxy especially preferably

[0088] L1 and L2 express a connection machine. The connection machine expressed with L1 and L2 is a bivalent desirable connection machine of the length for 1 or 4 atoms, and may have the substituent further. As a desirable example, -CH₂-, -CH₂CH₂-, -C(=O)-, -CONH-, and -SO₂NH- can be mentioned.

[0089] n1 and n2 express or more 0 30 or less integer. A combination desirable as L1, L2, and n1 and n2 It is desirable that it is 0 or 10 as n1 and n2 when L1 and L2 express the connection machine of the length of 0 or 2 atoms, and when L1 and L2 express the connection machine of the length of 3 or 4 atoms, it is desirable that it is 0 or 6 as n1 and n2. As a combination of L1, L2, and n1 and n2, L1 and L2 express the connection machine of the length of 0 or 2 atoms, and it is still more desirable that it is 0 or 6 as n1 and n2. Especially the thing for which L1 and L2 express -CH₂-, -CH₂CH₂-, -C(=O)-, -CONH-, and -SO₂NH-, and n1 and n2 express 0 or 2 as a combination of L1, L2, and n1 and n2 is desirable.

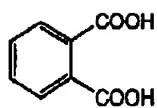
[0090] It III(s). the compound expressed with the formula (A) of this invention -- for example, new experimental science lecture (Maruzen) 14- Chapter 5 -1, Organic Functional Group Preparations of Chapter I-9 (Academic Press New York and London), Tetrahedron, 31 volumes (20), 2607 - 19 pages (1975), Angewante According to the method of a publication, it is compoundable in the reference quoted by Chem.86 volume (9), 349 pages (1974), and these. Moreover, you may use a commercial compound.

[0091] Although the example of an organic-acid compound expressed with a formula (A) below is given, this invention is not limited to these.

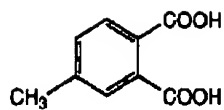
[0092]

[Formula 8]

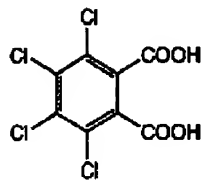
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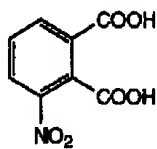
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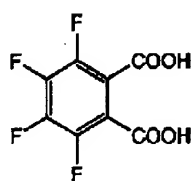
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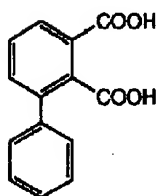
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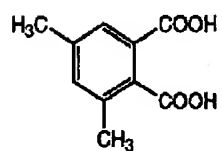
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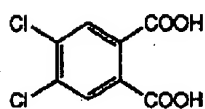
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A-7

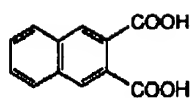


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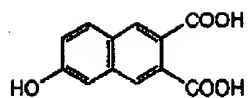


[0093]
[Formula 9]

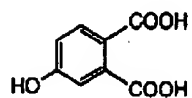
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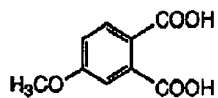
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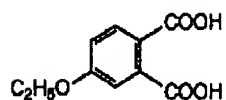
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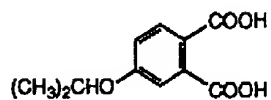
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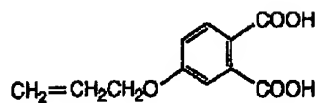
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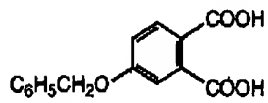
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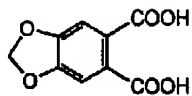
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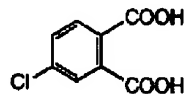
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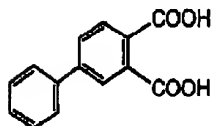
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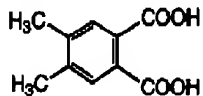
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A-19

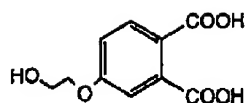


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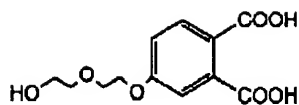


[0094]
[Formula 10]

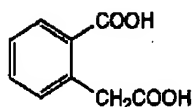
A - 2 1



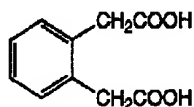
A - 2 2



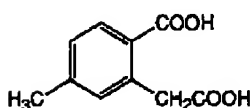
A - 2 3



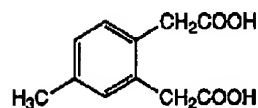
A - 2 4



A - 2 5



A - 2 6



[0095] The addition of the compound expressed with a formula (A) has ten - four mols - desirable ten mols per one mol of Ag, and further ten - three mols - its one mol is desirable. Moreover, even if the compound expressed with a formula (A) uses only a kind, it may use two or more sorts together.

[0096] You may add the compound expressed with the formula (A) of this invention by what methods, such as a solution, powder, and a solid-state particle distribution object. Solid-state particle distribution is performed with well-known detailed-ized meanses (for example, , a ball mill, a vibration ball mill, a sand mill, a colloid mill, a jet mill, a roller mill, etc.). Moreover, in case solid-state particle distribution is carried out, you may use a distributed assistant.

[0097] The compound expressed with the formula (A) of this invention can be added in the layer by the side of the image formation layer of sensitive material, for example, the photosensitive layer which may turn into an image formation layer, and the nonphotosensitivity layer by the side of this layer.

[0098] The film surface pH before heat developing processing of the heat developing sensitive material of this invention is six or less, and is 5.3 or less still more preferably 5.5 or less preferably. It is about three although there is especially no limit in the minimum.

[0099] As for regulation of a film surface pH, it is desirable to use volatile bases, such as nonvolatile acids, such as an organic acid expressed with the aforementioned formula (A) and a sulfuric acid, and ammonia, from a viewpoint of reducing a film surface pH.

[0100] Especially ammonia is desirable, when attaining the low film surface pH, since it is easy to volatilize, and it is removable before heat developing is carried out, the process to apply and.

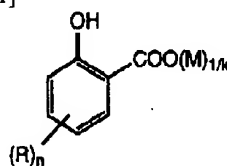
[0101] In addition, measurement of the film surface pH of this invention folds heat developing sensitive-material 2.5cmx2.5cm before heat developing processing in boat form, and is 300microl to the image formation layer side. After dropping distilled water and putting it for 30 minutes, it is pH about the dropping liquid. It carried out by measuring for 1 minute by BOY-P2 (pH meter of the Shindengen Electric Mfg. Co., Ltd. make and a semiconductor method).

[0102] The heat developing sensitive material of this invention is desirable when reducing fogging at the time of preservation of the heat developing sensitive material that whose kind content of the compound expressed with the layer of the side which has an image formation layer by the following formula (B) is carried out at least it is the purpose of this invention.

[0103]

[Formula 11]

式 (B)



[0104] In a formula (B), M expresses the cations (for example, ammonium ions, such as metal ions, such as sodium ion, potassium ion, calcium ion, barium ion, and zinc ion, a tetramethyl ammonium ion, and a tetrabutyl ammonium ion etc.) of a

hydrogen atom or k **. k is one or more integers, as the ion illustrated shows, and it is usually 1 or 2. Moreover, it is k= 1 when M is a hydrogen atom.

[0105] a formula (B) -- setting -- R -- a substituent -- expressing -- for example, a straight chain, branching, or an annular alkyl group (it is 1-8 especially preferably desirable -- carbon numbers 1-20 -- more -- desirable -- 1-12 --) for example, a methyl, ethyl, an iso-propyl, t-butyl, n-octyl, 1, 1 and 3, 3-tetramethyl butyl, t-amyl, cyclohexyl, etc. are mentioned an alkenyl machine (especially, it is 2-8 preferably, for example, a vinyl, an allyl compound, 2-butenyl, 3-pentenyl, etc. are mentioned. desirable -- carbon numbers 2-20 -- more -- desirable -- 2-12 --) an alkynyl group (it is 2-8 especially preferably desirable -- carbon numbers 2-20 -- more -- desirable -- 2-12 --) for example, propargyl, 3-cutting-pliers nil, etc. are mentioned an aralkyl machine (especially, it is 7-16 preferably, for example, a benzyl, alpha-methyl benzyl, alpha-ethyl benzyl, a diphenyl methyl, a naphthyl methyl, naphthyl phenylmethyl, etc. are mentioned. desirable -- carbon numbers 7-30 -- more -- desirable -- 7-20 --) an aryl group (it is 6-12 especially preferably desirable -- carbon numbers 6-30 -- more -- desirable -- 6-20 [] --) for example, a phenyl, p-methylphenyl, a naphthyl, etc. are mentioned the amino group (it is 0-6 still more preferably, for example, AMINO, methylamino, dimethylamino, diethylamino, dibenzylamino, etc. are mentioned. desirable -- carbon numbers 0-20 -- more -- desirable -- 0-10 --) an alkoxy group (it is 1-8 especially preferably desirable -- carbon numbers 1-20 -- more -- desirable -- 1-12 --) for example, a methoxy, ethoxy **, butoxy, etc. are mentioned an aryloxy group (especially, it is 6-12 preferably, for example, phenyloxy, 2-naphthyloxy, etc. are mentioned. desirable -- carbon numbers 6-20 -- more -- desirable -- 6-16 --) an acyl group (especially, it is 1-12 preferably, for example, an acetyl, a benzoyl, the formyl, pivaloyl, etc. are mentioned. desirable -- carbon numbers 1-20 -- more -- desirable -- 1-16 --) an alkoxy carbonyl group (it is 2-12 especially preferably desirable -- carbon numbers 2-20 -- more -- desirable -- 2-16 --) for example, a methoxycarbonyl, ethoxycarbonyl, etc. are mentioned an aryloxy carbonyl group (especially, it is 7-10 preferably, for example, a phenoxy carbonyl etc. is mentioned. desirable -- carbon numbers 7-20 -- more -- desirable -- 7-16 --) an acyloxy machine (especially, it is 2-10 preferably, for example, acetoxo, benzoyloxy one, etc. are mentioned. desirable -- carbon numbers 1-20 -- more -- desirable -- 2-16 --) the acylamino machine (it is 2-10 especially preferably desirable -- carbon numbers 1-20 -- more -- desirable -- 2-16 --) for example, acetylamino, benzoylamino, etc. are mentioned an alkoxy carbonylamino machine (especially, it is 2-12 preferably, for example, methoxycarbonylamino etc. is mentioned. desirable -- carbon numbers 2-20 -- more -- desirable -- 2-16 --) an aryloxy carbonylamino machine (especially, it is 7-12 preferably, for example, phenyloxy carbonylamino etc. is mentioned. desirable -- carbon numbers 7-20 -- more -- desirable -- 7-16 --) a sulfonylamino machine (it is 1-12 especially preferably desirable -- carbon numbers 1-20 -- more -- desirable -- 1-16 --) for example, methanesulfonylamino, benzenesulphonyl amino, etc. are mentioned a sulfamoyl group (especially, it is 0-12 preferably, for example, sulfamoyl, methyl sulfamoyl, dimethyl sulfamoyl, phenyl sulfamoyl, etc. are mentioned. desirable -- carbon numbers 0-20 -- more -- desirable -- 0-16 --) a carbamoyl group (it is 0-12 especially preferably desirable -- carbon numbers 0-20 -- more -- desirable -- 0-16 --) for example, a carbamoyl, diethylcarbamoyl, phenylcarbamoyl, etc. are mentioned a ureido machine (especially, it is 1-12 preferably, for example, a ureido, a methyl ureido, phenyl UREI, etc. are mentioned. desirable -- carbon numbers 1-20 -- more -- desirable -- 1-16 --) an alkyl thio machine (especially, it is 1-12 preferably, for example, a methylthio, an ethyl thio, etc. are mentioned. desirable -- carbon numbers 1-20 -- more -- desirable -- 1-16 --) an aryl thio machine (it is 6-12 especially preferably desirable -- carbon numbers 6-20 -- more -- desirable -- 6-16 --) for example, phenylthio etc. is mentioned a sulfonyl machine (especially, it is 1-12 preferably, for example, a mesyl, a tosyl, etc. are mentioned. desirable -- carbon numbers 1-20 -- more -- desirable -- 1-16 --) a sulfinyl machine (especially, it is 1-12 preferably, for example, a methane sulfinyl, a benzene sulfinyl, etc. are mentioned. desirable -- carbon numbers 1-20 -- more -- desirable -- 1-16 --) a phosphoric acid amide group (it is 1-12 especially preferably desirable -- carbon numbers 1-20 -- more -- desirable -- 1-16 --) for example, a diethyl phosphoric acid amide, a phenyl phosphoric acid amide, etc. are mentioned a hydroxy group, a sulfhydryl group, and a halogen atom (for example, a fluorine atom --) A chlorine atom, a bromine atom, an iodine atom, a cyano group, a sulfonic group, a carboxy group, A nitro group, a hydronalium KISAMU machine, a SURUFINO machine, a hydrazino machine, a sulfonyl thio machine, a thio sulfonyl machine, a heterocycle machine (for example, imidazolyl, pyridyl, a furil, piperidyl, MORIHORIRU, etc. are mentioned.) A disulfide machine etc. is mentioned.

[0106] Further, these substituents may be replaced, and when it is the basis in which salt formation is possible, they may form the salt. moreover, in a certain case, i.e., 2 case of $n \geq$, although n is the integer of 1-4, even if two or more substituents are the same, they may differ As for n, 1-3 are desirable, and 2 is the most desirable.

[0107] Moreover, it may join together mutually and these substituents may form the un-aromatic or aromatic ring (for example, benzene ring) of 5 members or 7 member rings. Furthermore, this ring may be replaced by other substituents (for example, a halogen atom, a carboxy group).

[0108] Preferably as a substituent expressed with R An alkyl group, an alkenyl machine, An alkynyl group, an aralkyl machine, an aryl group, the amino group, an alkoxy group, An acyl group, an alkoxy carbonyl group, an acyloxy machine, the acylamino machine, An alkoxy carbonylamino machine, a sulfonylamino machine, a sulfamoyl group, A carbamoyl group, a ureido machine, an alkyl thio machine, a sulfonyl machine, a hydroxy group, They are a sulfhydryl group, a halogen atom, a cyano group, a sulfonic group, a carboxy group, a nitro group, and a heterocycle machine. still more preferably They are an alkyl group, an alkenyl machine, an aralkyl machine, the amino group, an alkoxy group, an alkyl thio machine, a hydroxy group, a sulfhydryl group, a halogen atom, a sulfonic group, and a carboxy group.

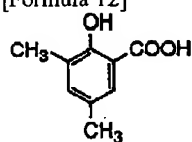
[0109] Furthermore, in a formula (B), especially the thing that an alkyl group (an aralkyl machine is also included.) replaces by the ortho position and/or the para position of a hydroxyl group is desirable.

[0110] Moreover, the bisphenol structure combined through one carbon also has the more desirable compound of a formula (B).

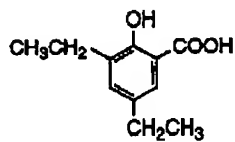
[0111] Next, although the example of the compound of a formula (B) is shown, it is not limited to this.

[0112]

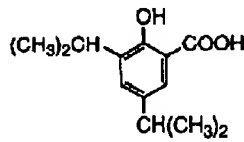
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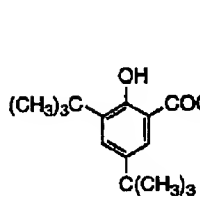
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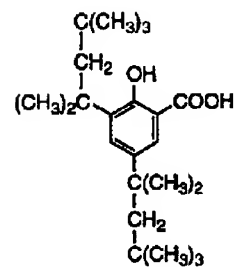
(B-2)



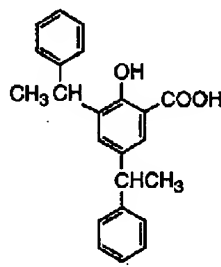
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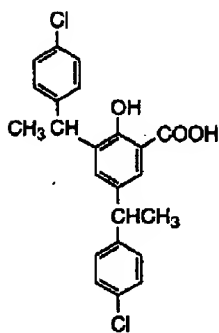
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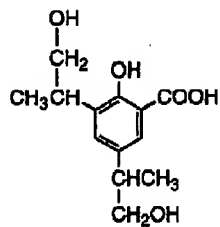
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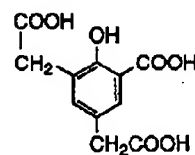
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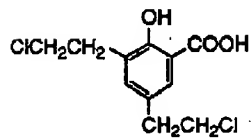
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(B-8)



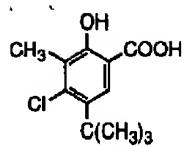
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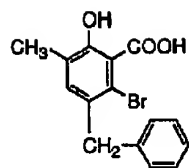
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[0113]

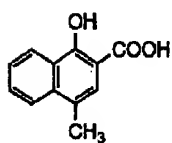
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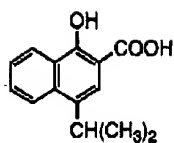
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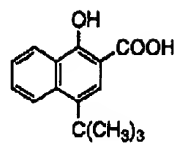
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(B-13)



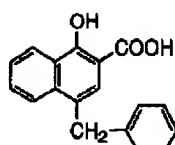
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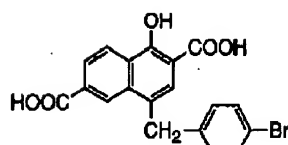
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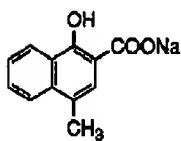
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(B-17)



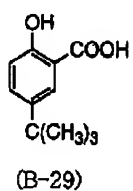
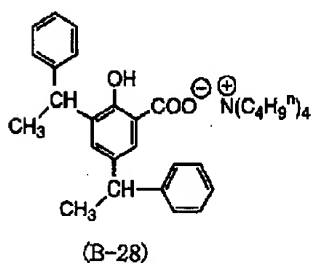
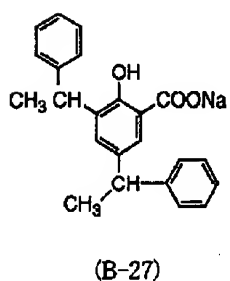
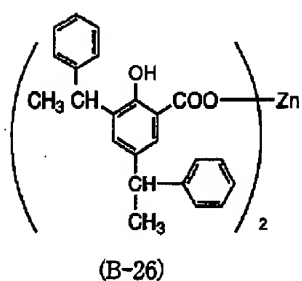
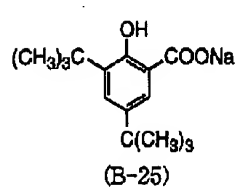
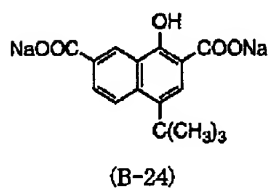
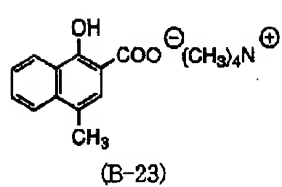
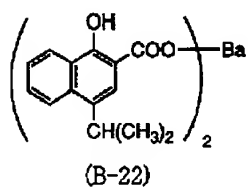
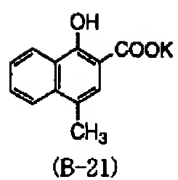
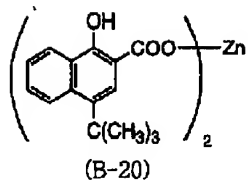
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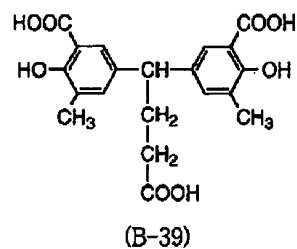
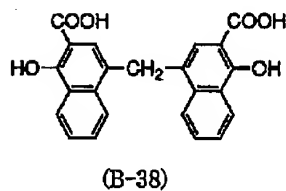
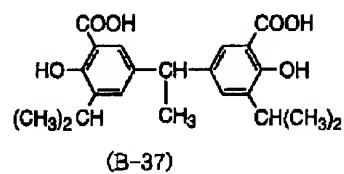
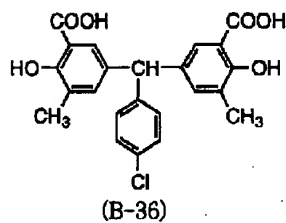
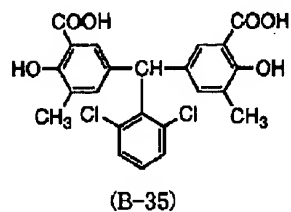
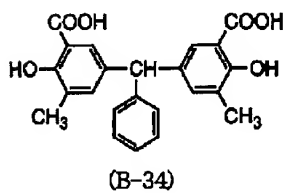
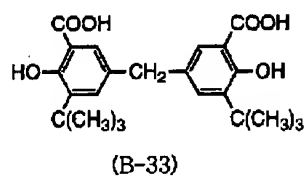
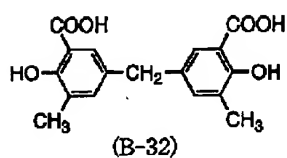
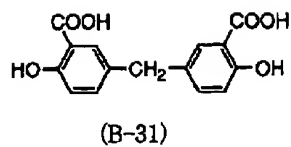
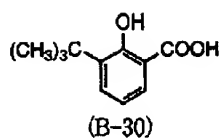
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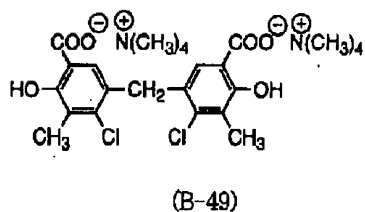
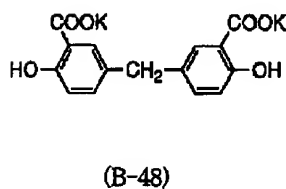
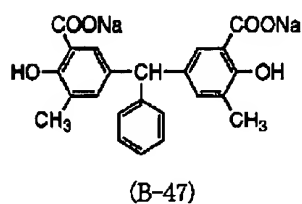
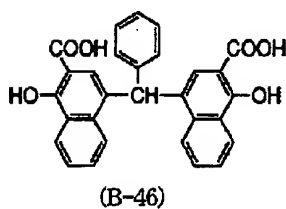
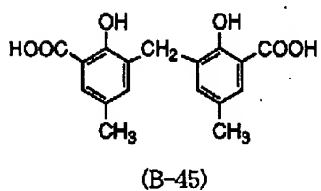
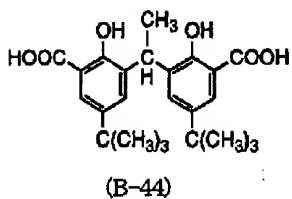
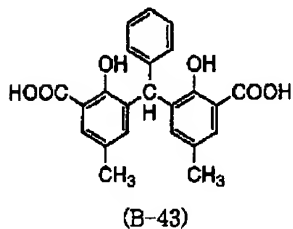
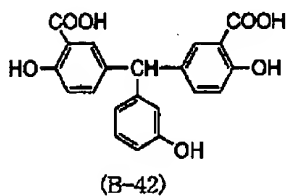
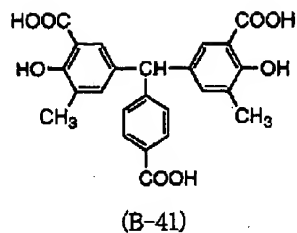
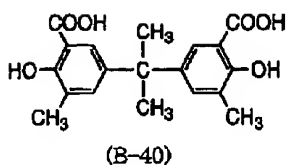
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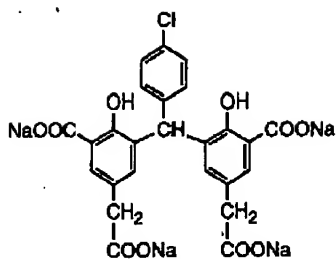
[0115]
[Formula 15]



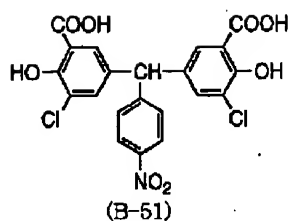
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[Formula 16]



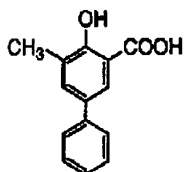
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[Formula 17]



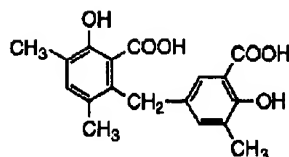
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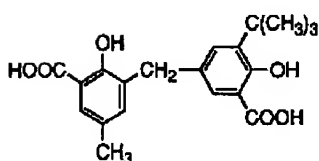
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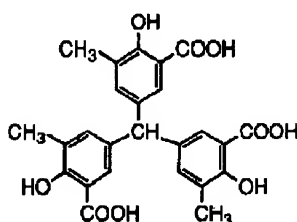
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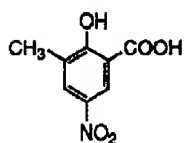
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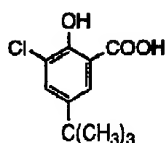
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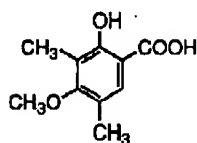
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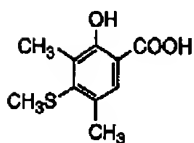
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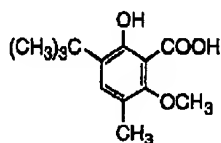
(B-57)



(B-58)



(B-59)



(B-60)

[0118] The compound of the formula (B) of this invention is easily compoundable with the method which may use a commercial thing and is indicated by JP,2-251838,A, J.Med. Chem., the acid-catalyst condensation reaction of a salicylic acid given in 34,342 (1991), and a carbonyl compound, etc.

[0119] The compound of the formula (B) of this invention can be dissolved and used for water or a suitable organic solvent (a methanol, ethanol, propanol, fluoridation alcohol), for example, alcohols, ketones (an acetone, methyl ethyl ketone), a dimethylformamide, dimethyl sulfoxide, a methyl Cellosolve, etc.

[0120] Moreover, by the emulsification variational method already known well, it can dissolve using auxiliary solvents, such as oil, such as a dibutyl phthalate, a tricresyl phosphate, a glyceryl triacetate, or diethyl phthalate, ethyl acetate, and a cyclohexanone, and an emulsification distribution object can be produced and used mechanically. Or by the method learned as a solid-state variational method, into water, a ball mill, a colloid mill, a Sand-grinder mill, MANTON gaulin, a Micro fluidizer, or an ultrasonic wave can distribute, and powder can be used.

[0121] Although you may add to a base material in the layer by the side of an image formation layer, i.e., an image formation layer, and any of other layer by the side of this layer, as for the compound of the formula (B) of this invention, it is desirable to add in the layer which adjoins an image formation layer or it. As for an image formation layer, it is desirable that it is a layer containing the silver salt (organic silver salt) which can return, and is the photosensitive layer which contains a photosensitive silver halide further preferably.

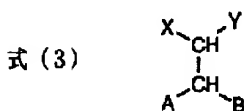
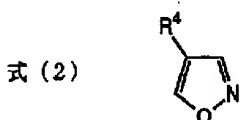
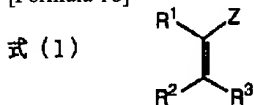
[0122] The addition of the compound of the formula (B) of this invention is 1×10^{-4} - 5×10^{-2} mol/molAg still more preferably more preferably preferably [the amount (mol/molAg) of mol(s) to Ag 1mol shows, and] 5×10^{-5} to 1×10^{-1} mol/molAg 1×10^{-5} to 5×10^{-1} mol/molAg. Even if these use only one sort, they may use two or more sorts together.

[0123] The heat developing sensitive material of this invention contains ***** in an image formation layer, its adjacent layer, or both [these] layers, in order to acquire a high contrast picture. The acetal compound and hydrazine derivative of the specification expressed with the substitution alkene derivative which is used for this invention, and which is expressed with a formula (1) as ***** , the substitution isoxazole derivative expressed with a formula (2), and a formula (3) are used preferably.

[0124] The substitution alkene derivative expressed with the formula (1) used by this invention, the substitution isoxazole derivative expressed with a formula (2), and the specific acetal compound expressed with a formula (3) are explained.

[0125]

[Formula 18]



[0126] In a formula (1), R1, R2, and R3 express a hydrogen atom or a substituent independently, respectively, and Z expresses an electronic suction nature machine or a silyl machine. In a formula (1), it may join together mutually and R2, R3, R1 and R2, or R3 and Z may form the cyclic structure. [R1, Z,] In a formula (2), R4 expresses a substituent. In a formula (3), X and Y express a hydrogen atom or a substituent independently, respectively, and A and B express an alkoxy group, an alkyl thio machine, an alkylamino machine, an aryloxy group, an aryl thio machine, the Ernie Reno machine, a heterocycle oxy-basis, a heterocycle thio machine, or the heterocycle amino group independently, respectively. In a formula (3), it may join together mutually and X, Y, or A and B may form the cyclic structure.

[0127] The compound expressed with a formula (1) is explained in detail. In a formula (1), R1, R2, and R3 express a hydrogen atom or a substituent independently, respectively, and Z expresses an electronic suction nature machine or a silyl machine. In a formula (1), it may join together mutually and R2, R3, R1 and R2, or R3 and Z may form the cyclic structure. [R1, Z,]

[0128] When R1, R2, and R3 express a substituent, as an example of a substituent For example, a halogen atom (a fluorine atom, a bromine atom, or iodine atom), An alkyl group (an aralkyl machine, a cycloalkyl machine, an activity methine group, etc. are included), An alkenyl machine, an alkynyl group, an aryl group, a heterocycle machine (the nitrogen-containing heterocycle machine of N-substitution is included), The heterocycle machine (for example, pyridinio machine), acyl group containing the nitrogen atom formed into 4 class, An alkoxy carbonyl group, an aryloxy carbonyl group, a carbamoyl group, A carboxy group or its salt, an imino group, the imino group replaced by N atom, A thiocarbonyl group, a sulfonyl carbamoyl group, an acyl carbamoyl group, A sulfamoyl carbamoyl group, a carbazoyl machine, an oxalyl machine, an OKISA moi machine, A cyano group, a thio carbamoyl group, a hydroxy group or its salt, an alkoxy group (the basis which repeats and includes an ethyleneoxy machine or a propylene oxy-basis unit is included), An aryloxy group, a heterocycle oxy-basis, an acyloxy machine, carbonyloxy group (alkoxy ***** is aryloxy), a carbamoyloxy machine, a sulfonyloxy machine, and the amino group (an alkyl --) An aryl or the heterocycle amino group, the acylamino machine, a sulfonamide machine, A ureido machine, a thio ureido machine, an imido basis, a carbonylamino (alkoxy ***** is aryloxy) machine, A sulfamoylamino group, a semicarbazide machine, a thiosemicarbazide machine, A hydrazino machine, the ammonio machine of the 4th class, the OKISA moi amino group, a sulfonyl (alkyl or aryl) ureido machine, An acyl ureido machine, an acyl sulfamoylamino group, a nitro group, a sulfhydryl group, A thio machine, an acyl thio machine, a sulfonyl (alkyl or aryl) machine, (An alkyl, an aryl, or heterocycle) A sulfinyl machine, a sulfonic group, or its salt, (An alkyl or aryl) A basis including a sulfamoyl group, an acyl sulfamoyl group, a sulfonyl sulfamoyl group or its salt, a phosphoryl machine, a phosphoric-acid amide, or phosphoric ester structure, a silyl machine, a sutor nil machine, etc. are mentioned.

[0129] These substituents may be further replaced by these substituents.

[0130] With the electronic suction nature machine expressed with Z in a formula (1) Hammett's substituent-constant sigma_p is the thing of the substituent which can take a positive value. specifically A cyano group, an alkoxy carbonyl group, an aryloxy carbonyl group, A carbamoyl group, an imino group, the imino group replaced by N atom, a thiocarbonyl group, A sulfamoyl group, an alkyl sulfonyl machine, an aryl sulfonyl machine, A nitro group, a halogen atom, a perfluoro alkyl group, a perfluoro alkane amide group, A sulfonamide machine, an acyl group, a formyl machine, a phosphoryl machine, a carboxy group (or the salt), It is the aryl group replaced with a sulfonic group (or the salt), a heterocycle machine, an alkenyl machine, an alkynyl group,

the acyloxy machine, the acyl thio machine, the sulfonyloxy machine, or these electronic suction nature machine. As a heterocycle machine, it is the heterocycle machine of saturation or an unsaturation, for example, a pyridyl machine, a quinolyl machine, a pyrazinyl machine, a kino KISARINIRU machine, a benzo thoria ZORIRU machine, an imidazolyl machine, a Benz imidazolyl machine, a hydantoin-1-IRU machine, a succinimide machine, a phthalimide machine, etc. are mentioned here as the example.

[0131] The same thing as the substituent which the electronic suction nature machine expressed with Z in a formula (1) may have the substituent further, and you may have as the substituent when R1, R2, and R3 of a formula (1) express a substituent is mentioned.

[0132] Although R2, R3, R1 and R2, or R3 and Z may be combined mutually and the cyclic structure may be formed in a formula (1), the cyclic structure formed at this time is the ring of non-aromatic series, or the heterocycle of non-aromatic series. [R1, Z]

[0133] Next, the desirable range of a compound expressed with a formula (1) is described. They are a trimethylsilyl machine, t-butyl dimethylsilyl machine, a phenyl dimethylsilyl machine, a triethyl silyl machine, a triisopropyl silyl machine, a trimethylsilyl dimethylsilyl machine, etc. concretely preferably as a silyl machine expressed with Z in a formula (1).

[0134] As an electronic suction nature machine expressed with Z in a formula (1), preferably The following bases with 0-30 total carbons, i.e., a cyano group, an alkoxy carbonyl group, An aryloxy carbonyl group, a carbamoyl group, a thiocarbonyl group, An imino group, the imino group replaced by N atom, a sulfamoyl group, an alkyl sulfonyl machine, An aryl sulfonyl machine, a nitro group, a perfluoro alkyl group, an acyl group, It is the phenyl group replaced with a formyl machine, a phosphoryl machine, an acyloxy machine, an acyl thio machine, or arbitrary electronic suction nature machines. still more preferably A cyano group, an alkoxy carbonyl group, a carbamoyl group, an imino group, a sulfamoyl group, An alkyl sulfonyl machine, an aryl sulfonyl machine, an acyl group, a formyl machine, It is the phenyl group replaced with a phosphoryl machine, a trifluoromethyl machine, or arbitrary electronic suction nature machines, and they are a cyano group, a formyl machine, an acyl group, an alkoxy carbonyl group, an imino group, or a carbamoyl group especially preferably.

[0135] The basis expressed with Z in a formula (1) has a more desirable electronic suction nature machine.

[0136] As a substituent expressed with R1, R2, and R3 in a formula (1), preferably The electronic suction nature machine specifically expressed with Z of an above-mentioned formula (1) by the basis with 0-30 total carbons, and the basis of homonymy, And an alkyl group, a hydroxy group (or the salt), a sulfhydryl group (or the salt), An alkoxy group, an aryloxy group, a heterocycle oxy-basis, an alkyl thio machine, The aryl group which is not replaced [an aryl thio machine, a heterocycle thio machine, the amino group, an alkylamino machine, an arylamino machine, the heterocycle amino group, a ureido machine, the acylamino machine, a sulfonamide machine, substitution or] is mentioned.

[0137] Furthermore in a formula (1), R1 is an electronic suction nature machine, an aryl group, an alkyl thio machine, an alkoxy group or the acylamino machine, a hydrogen atom, or a silyl machine preferably.

[0138] When R1 expresses an electronic suction nature machine, preferably The following bases with 0-30 total carbons, Namely, a cyano group, a nitro group, an acyl group, a HORUMIRU machine, an alkoxy carbonyl group, An aryloxy carbonyl group, a thiocarbonyl group, an imino group, the imino group replaced by N atom, An alkyl sulfonyl machine, an aryl sulfonyl machine, a carbamoyl group, a sulfamoyl group, A trifluoromethyl machine, a HOSUHORIRU machine, a carboxy group (or the salt), It is the heterocycle machine of saturation or an unsaturation. further Or a cyano group, an acyl group, The heterocycle machine of a HORUMIRU machine, an alkoxy carbonyl group, a carbamoyl group, an imino group, the imino group replaced by N atom, a sulfamoyl group, a carboxy group (or the salt), saturation, or an unsaturation is desirable. It is the heterocycle machine of a cyano group, a HORUMIRU machine, an acyl group, an alkoxy carbonyl group, a carbamoyl group, saturation, or an unsaturation especially preferably.

[0139] Although it is the phenyl group of substitution or no replacing with 6-30 total carbons preferably and arbitrary substituents are mentioned as a substituent when R1 expresses an aryl group, the substituent of electronic suction nature is desirable especially.

[0140] In a formula (1), R1 is a time of expressing an electronic suction nature machine or an aryl group more preferably.

[0141] As a substituent expressed with R2 and R3 in a formula (1), preferably The electronic suction nature machine concretely expressed with Z of an above-mentioned formula (1), and the basis of homonymy, An alkyl group, a hydroxy group (or the salt), a sulfhydryl group (or the salt), It is the phenyl group which is not replaced [an alkoxy group, an aryloxy group, a heterocycle oxy-basis, an alkyl thio machine, an aryl thio machine, a heterocycle thio machine, the amino group, an alkylamino machine, the Ernie Reno machine, the heterocycle amino group, the acylamino machine, substitution, or].

[0142] In a formula (1), still more preferably, either is a hydrogen atom and R2 and R3 are the times of another side expressing a substituent. Preferably as the substituent An alkyl group, a hydroxy group (or the salt), A sulfhydryl group (or the salt), An alkoxy group, an aryloxy group, A heterocycle oxy-basis, an alkyl thio machine, an aryl thio machine, a heterocycle thio machine, The amino group, an alkylamino machine, the Ernie Reno machine, the heterocycle amino group, the acylamino machine (especially perfluoro alkane amide group), They are the phenyl group which is not replaced [a sulfonamide machine, substitution, or] or a heterocycle machine. Still more preferably A hydroxy group (or the salt), a sulfhydryl group (or the salt), It is an alkoxy group, an aryloxy group, a heterocycle oxy-basis, an alkyl thio machine, an aryl thio machine, a heterocycle thio machine, or a heterocycle machine, and they are a hydroxy group (or the salt), an alkoxy group, or a heterocycle machine especially preferably.

[0143] In a formula (1), Z, R1, or when R2 and R3 form a cyclic structure again, it is desirable. In this case, as for 1-40, and a further, 3-30 are [the number of total carbons which the cyclic structure formed is a non-aroma group's ring, or a non-aroma group's heterocycle, is the cyclic structure of 5 member - 7 member preferably, and includes a substituent] desirable.

[0144] Although it is more desirable, in the compound expressed with a formula (1) one Z expresses a cyano group, a

HORUMIRU machine, an acyl group, an alkoxy carbonyl group, an imino group, or a carbamoyl group, and R1 expresses an electronic suction nature machine or an aryl group. either R2 or R3 by the hydrogen atom Another side is a compound showing a hydroxy group (or the salt), a sulfhydryl group (or the salt), an alkoxy group, an aryloxy group, a heterocycle oxy-basis, an alkyl thio machine, an aryl thio machine, a heterocycle thio machine, or a heterocycle machine. Although it is desirable especially in the compound expressed with a formula (1) further again, one Z and R1 form the cyclic structure of a non-aroma group's 5 members - 7 members. either R2 or R3 by the hydrogen atom Another side is a compound showing a hydroxy group (or the salt), a sulfhydryl group (or the salt), an alkoxy group, an aryloxy group, a heterocycle oxy-basis, an alkyl thio machine, an aryl thio machine, a heterocycle thio machine, or a heterocycle machine. At this time, as Z which forms a non-aroma group's cyclic structure with R1, an acyl group, a carbamoyl group, an oxy-carbonyl group, a thiocarbonyl group, a sulfonyl machine, etc. are desirable, and an acyl group, a carbamoyl group, an oxy-carbonyl group, a thiocarbonyl group, a sulfonyl machine, an imino group, the imino group replaced by N atom, the acylamino machine, a carbonyl thio machine, etc. are desirable as R1.

[0145] Next, the compound expressed with a formula (2) is explained. In a formula (2), R4 expresses a substituent. The thing same as a substituent expressed with R4 as the thing explaining the substituent of R1-R3 of a formula (1) is mentioned.

[0146] The substituent expressed with R4 is an electronic suction nature machine or an aryl group preferably. When R4 expresses an electronic suction nature machine, preferably The following bases with 0-30 total carbons. Namely, a cyano group, a nitro group, an acyl group, a HORUMIRU machine, an alkoxy carbonyl group, An aryloxy carbonyl group, an alkyl sulfonyl machine, an aryl sulfonyl machine, A carbamoyl group, a sulfamoyl group, a trifluoromethyl machine, a HOSUHORIRU machine, It is the heterocycle machine of an imino group, saturation, or an unsaturation, and a cyano group, an acyl group, a HORUMIRU machine, an alkoxy carbonyl group, a carbamoyl group, a sulfamoyl group, an alkyl sulfonyl machine, an aryl sulfonyl machine, and a heterocycle machine are still more desirable. They are a cyano group, a HORUMIRU machine, an acyl group, an alkoxy carbonyl group, a carbamoyl group, or a heterocycle machine especially preferably.

[0147] When R4 expresses an aryl group, it is the phenyl group of substitution or no replacing with 0-30 total carbons preferably, and as a substituent, when R1, R2, and R3 of a formula (1) express a substituent, the same thing as what was explained as the substituent is mentioned.

[0148] R4 is a phenyl group which is not replaced [a cyano group, an alkoxy carbonyl group, a carbamoyl group, a heterocycle machine, substitution, or] especially preferably, and is a cyano group, a heterocycle machine, or an alkoxy carbonyl group most preferably.

[0149] Next, the compound expressed with a formula (3) is explained in detail. In a formula (3), X and Y express a hydrogen atom or a substituent independently, respectively, and A and B express an alkoxy group, an alkyl thio machine, an alkylamino machine, an aryloxy group, an aryl thio machine, the Ernie Reno machine, a heterocycle thio machine, a heterocycle oxy-basis, or the heterocycle amino group independently, respectively. It may join together mutually and X, Y, or A and B may form the cyclic structure.

[0150] The thing same as a substituent expressed with X and Y in a formula (3) as the thing explaining the substituent of R1-R3 of a formula (1) is mentioned. Specifically An alkyl group (a perfluoro alkyl group, a TORIKURORO methyl group, etc. are included), An aryl group, a heterocycle machine, a halogen atom, a cyano group, a nitro group, an ARUKENIRU machine, An alkynyl group, an acyl group, a HORUMIRU machine, an alkoxy carbonyl group, an aryloxy carbonyl group, An imino group, the imino group replaced by N atom, a carbamoyl group, a thiocarbonyl group, An acyloxy machine, an acyl thio machine, the acylamino machine, an alkyl sulfonyl machine, An aryl sulfonyl machine, a sulfamoyl group, a HOSUHORIRU machine, a carboxy group (or the salt), A sulfonic group (or the salt), a hydroxy group (or the salt), a sulfhydryl group (or the salt), An alkoxy group, an aryloxy group, a heterocycle oxy-basis, an alkyl thio machine, an aryl thio machine, a heterocycle thio machine, the amino group, an alkylamino machine, the Ernie Reno machine, the heterocycle amino group, a silyl machine, etc. are mentioned.

[0151] These bases may have the substituent further. Moreover, as a cyclic structure which it may join together mutually, and X and Y may form the cyclic structure, and is formed in this case, a non-aroma group's ring may also be a non-aroma group's heterocycle.

[0152] The substituent expressed with X and Y in a formula (3) 1-40 total carbons are bases with 1-30 total carbons more preferably. A cyano group, an alkoxy carbonyl group, an aryloxy carbonyl group, A carbamoyl group, an imino group, the imino group replaced by N atom, a thiocarbonyl group, A sulfamoyl group, an alkyl sulfonyl machine, an aryl sulfonyl machine, A nitro group, a perfluoro alkyl group, an acyl group, a HORUMIRU machine, a HOSUHORIRU machine, the acylamino machine, an acyloxy machine, an acyl thio machine, a heterocycle machine, an alkyl thio machine, an alkoxy group, or an aryl group is mentioned.

[0153] In a formula (3) more preferably X and Y A cyano group, a nitro group, an alkoxy carbonyl group, A carbamoyl group, an acyl group, a HORUMIRU machine, an acyl thio machine, the acylamino machine, A thiocarbonyl group, a sulfamoyl group, an alkyl sulfonyl machine, an aryl sulfonyl machine, An imino group, the imino group replaced by N atom, a HOSUHORIRU machine, a trifluoromethyl machine, They are a heterocycle machine or the replaced phenyl group. preferably especially A cyano group, An alkoxy carbonyl group, a carbamoyl group, an alkyl sulfonyl machine, It is the phenyl group replaced with an aryl sulfonyl machine, an acyl group, an acyl thio machine, the acylamino machine, a thiocarbonyl group, a HORUMIRU machine, an imino group, the imino group replaced by N atom, a heterocycle machine, or arbitrary electronic suction nature machines.

[0154] It is desirable, when X and Y join together mutually and form a non-aroma group's ring, or a non-aroma group's heterocycle. At this time, the cyclic structure formed has desirable 5 member - 7 member ring, and, as for 1-40, and a further, 3-30 are [the number of total carbons] desirable. As X and Y which form a cyclic structure, an acyl group, a carbamoyl group,

an oxy-carbonyl group, a thiocarbonyl group, a sulfonyl machine, an imino group, the imino group replaced by N atom, the acylamino machine, a carbonyl thio machine, etc. are desirable.

[0155] In a formula (3), A and B express an alkoxy group, an alkyl thio machine, an alkylamino machine, an aryloxy group, an aryl thio machine, the Ernie Reno machine, a heterocycle thio machine, a heterocycle oxy-basis, or the heterocycle amino group independently, respectively, it may join together mutually and these may form the cyclic structure. Preferably, 1-40 total carbons are bases with 1-30 total carbons more preferably, and the basis expressed with A and B in a formula (3) may have the substituent further.

[0156] In a formula (3), A and B have the more desirable case where these join together mutually and the cyclic structure is formed. The cyclic structure formed at this time has the desirable heterocycle of the non-aroma group of 5 member - 7 member ring, and, as for 1-40, and a further, 3-30 are [the number of total carbons] desirable. In this case, if the example (-A-B-) which A and B connected is given For example, -O- 2-O-, -O- (CH₂) 3-O-, -S- (CH₂) 2-S-, -S- (CH₂) 3-S-, -S-ph-S-, -N (CH₂) They are (CH₃)-(CH₂)₂-O-, -N(CH₃)-(CH₂)₂-S-, -O-(CH₂)₂-S-, -O-(CH₂)₃-S-, -N(CH₃)-ph-O-, -N(CH₃)-ph-S-, -N(ph)-(CH₂)₂-S-, etc.

[0157] The basis of the adsorptivity which sticks to the compound expressed with the formula (1) of this invention - a formula (3) to a silver halide may be incorporated. As such an adsorption machine, an alkyl thio machine, an aryl thio machine, a thiourea machine, U.S. Pat. No. 4,385,108, such as a thio amide group, a mercapto heterocycle machine, and a triazole machine, Said 4,459,347 numbers, JP,59-195233,A, 59-200231, 59-201045, 59-201046, 59-201047, The basis indicated by 59-201048, 59-201049, JP,61-170733,A, 61-270744, 62-948, 63-234244, 63-234245, and 63-234246 is mentioned. Moreover, the adsorption machine to these silver halides may be precursor-ized. The basis indicated by JP,2-285344,A is mentioned as such a precursor.

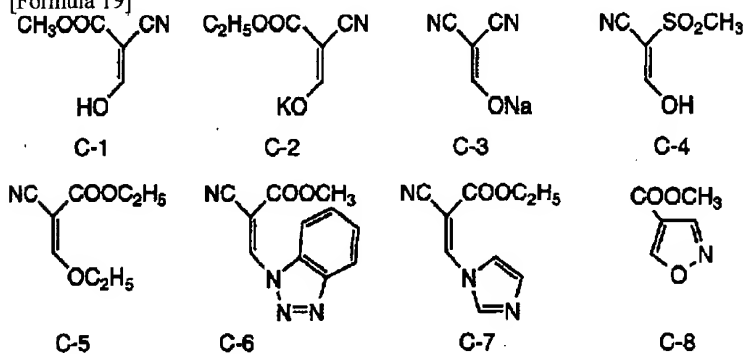
[0158] The ballast machine or polymer by which the compound expressed with the formula (1) of this invention - a formula (3) is regularly used in additives for immobility nature photographs, such as a coupler, in it may be incorporated. That into which especially the ballast machine is built is one of the desirable examples of this invention. To the photograph nature which has eight or more carbon numbers, a ballast machine is a comparatively inactive basis, for example, can be chosen from an alkyl group, an aralkyl machine, an alkoxy group, a phenyl group, an alkylphenyl machine, a phenoxy machine, an alkyl phenoxy machine, etc. Moreover, as polymer, the thing of a publication is mentioned, for example to JP,1-100530,A.

[0159] The compound expressed with the formula (1) of this invention - a formula (3) the inside of it -- a cation nature machine (the basis which specifically contains the ammonio machine of the 4th class --) Or a basis including the repeat unit of ethyleneoxy machines, such as a nitrogen-containing heterocycle machine containing the nitrogen atom formed into 4 class, or a propylene oxy-basis, (An alkyl, an aryl, or heterocycle) A thio machine or the dissociative machines (a carboxy group, a sulfonic group, an acyl sulfamoyl group, carbamoyl sulfamoyl group, etc.) which can be dissociated by the base may be contained. Especially the thing in which the basis including the repeat unit of an ethyleneoxy machine or a propylene oxy-basis or (an alkyl, an aryl, or heterocycle) the thio machine is contained is one of the desirable examples of this invention. As an example of these bases, the compound of a publication is mentioned, for example to JP,7-234471,A, JP,5-333466,A, JP,6-19032,A, JP,6-19031,A, JP,5-45761,A, U.S. JP,4994365,B, U.S. JP,4988604,B, JP,3-259240,A, JP,7-5610,A, JP,7-244348,A, the German country patent No. 4006032, etc.

[0160] Next, the example of a compound expressed with the formula (1) of this invention - a formula (3) is shown below. However, this invention is not limited to the following compounds.

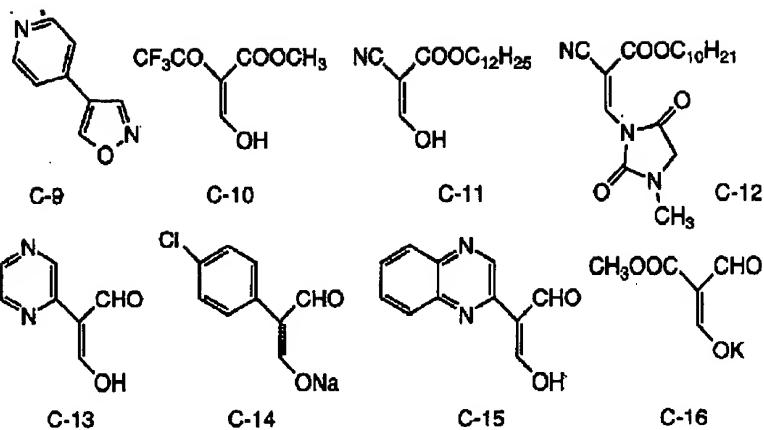
[0161]

[Formula 19]



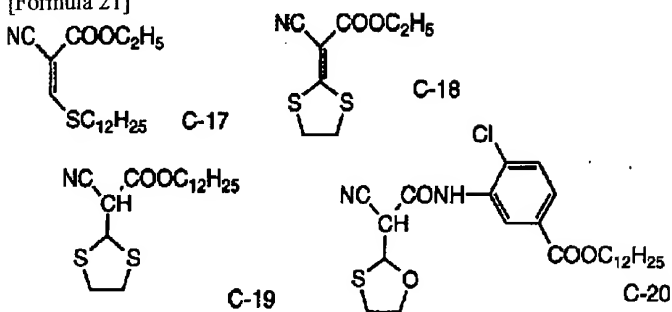
[0162]

[Formula 20]



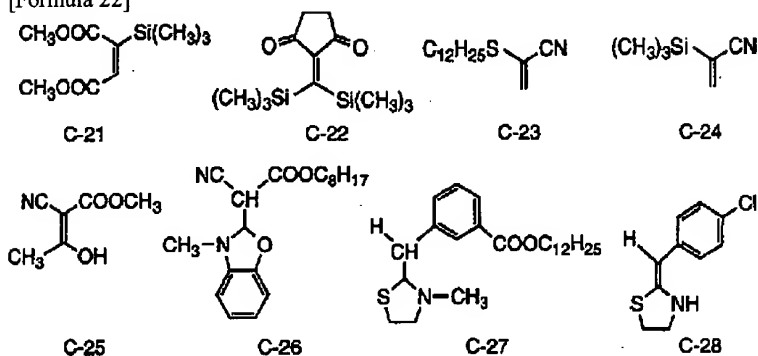
[0163]

[Formula 21]



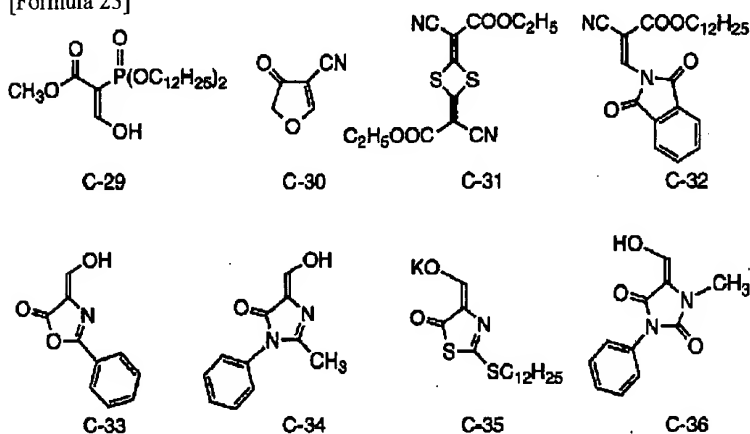
[0164]

[Formula 22]



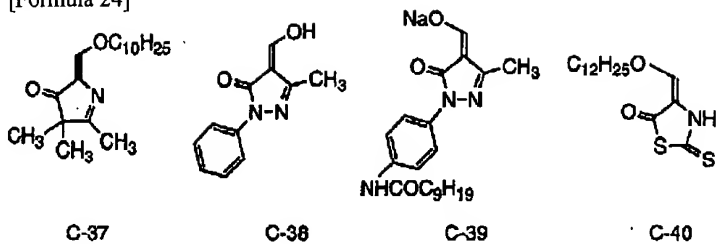
[0165]

[Formula 23]



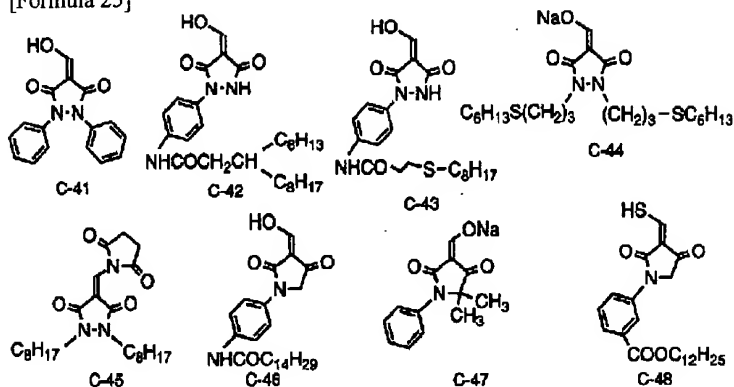
[0166]

[Formula 24]



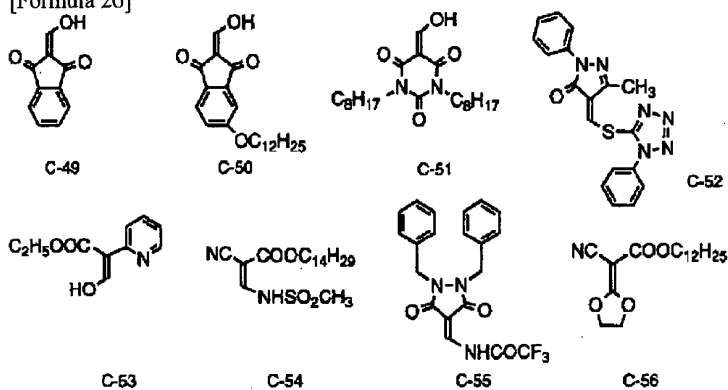
[0167]

[Formula 25]



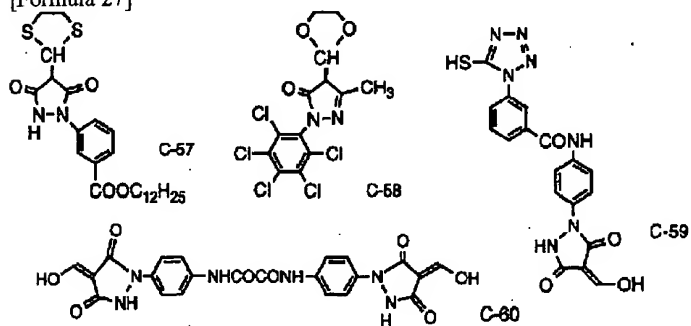
[0168]

[Formula 26]

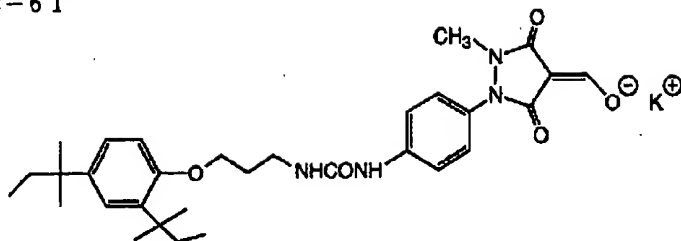


[0169]

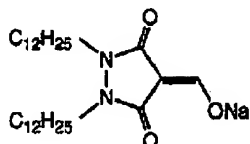
[Formula 27]



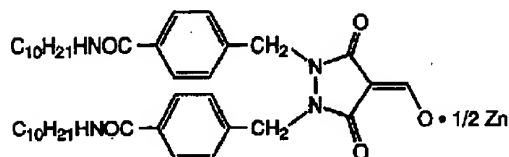
[0170]
[Formula 28]
C-6 1



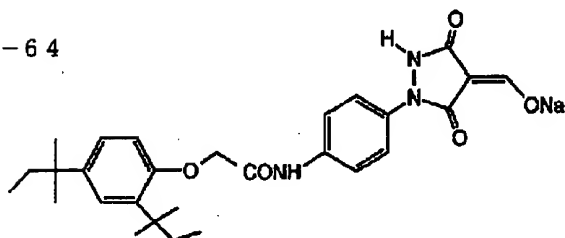
C-6 2



C-6 3



C-6 4



[0171] The compound expressed with the formula (1) of this invention - a formula (3) can be dissolved and used for water or a suitable organic solvent (a methanol, ethanol, propanol, fluorine-ized alcohol), for example, alcohols, ketones (an acetone, methyl ethyl ketone), a dimethylformamide, dimethyl sulfoxide, a methyl Cellosolve, etc.

[0172] Moreover, by the emulsification variational method already known well, it can dissolve using auxiliary solvents, such as oil, such as a dibutyl phthalate, a tricresyl phosphate, a glyceryl triacetate, or diethyl phthalate, ethyl acetate, and a cyclohexanone, and an emulsification distribution object can be produced and used mechanically. Or by the method learned as a solid-state variational method, into suitable solvents, such as water, a ball mill, a colloid mill, or an ultrasonic wave can distribute, and the powder of a compound can be used.

[0173] Although you may add to a base material in any layer of the binder layer by the side of an image formation layer, i.e., an image formation layer, and other binder layers by the side of this layer, as for the compound expressed with the formula (1) of this invention - a formula (3), it is desirable to add in the binder layer which adjoins an image formation layer or it.

[0174] The addition of the compound expressed with the formula (1) of this invention - a formula (3) has desirable 1×10^{-6} -1 mol to one mol of silver, its 1×10^{-5} to 5xten - one mol is more desirable, and its 2×10^{-5} to 2xten - one mol is the most desirable.

[0175] Although the compound expressed with a formula (1) - a formula (3) is easily compoundable by the well-known method, the method of a U.S. JP,5545515,B, U.S. JP,5635339,B, U.S. JP,5654130,B, the international patent WO -97/No. 34196 or Japanese Patent Application No. No. 354107 [nine to], Japanese Patent Application No. No. 309813 [nine to], and Japanese Patent Application No. [No. 272002 / nine to] publication is compoundable to reference, for example.

[0176] Even if it uses one sort of compounds expressed with the formula (1) of this invention - a formula (3), they may use two or more sorts together. Besides the above-mentioned thing, moreover, U.S. JP,5545515,B, U.S. JP,5635339,B, U.S. JP,5654130,B,

the international patent WO -97/No. 34196, a compound given in U.S. JP,5686228,B, Again Or Japanese Patent Application No. No. 279962 [eight to], Japanese Patent Application No. No. 228881 [nine to], Japanese Patent Application No. No. 273935 [nine to], Japanese Patent Application No. No. 354107 [nine to], Japanese Patent Application No. No. 309813 [nine to], You may use together and use the compound indicated by Japanese Patent Application No. No. 296174 [nine to], Japanese Patent Application No. No. 282564 [nine to], Japanese Patent Application No. No. 272002 [nine to], Japanese Patent Application No. No. 272003 [nine to], and Japanese Patent Application No. No. 332388 [nine to].

[0177] As hydrazine system ***** used for this invention, the following hydrazine derivative is used preferably. The hydrazine derivative used for this invention is compoundable by the various methods indicated by the following patent again.

[0178] With the compound expressed with the (** 1) of a publication to JP,6-77138,B, they are specifically a page 3 of the said official report, and the compound of a 4-page publication. the compound expressed with the general formula (I) of a publication to JP,6-93082,B -- concrete -- page [of the said official report] 8 - the compound of 1-38 of a 18-page publication They are specifically the compound 6-1 of the page 25 of the said official report, the compound 4-1 of a 26-page publication - a compound 4-10, the compound 5-1 to 5-42 of a 28 pages - 36 pages publication and 39 pages, and a 40-page publication - a compound 6-7 with the compound expressed with the general formula (4), general formula (5), and general formula (6) of a publication to JP,6-230497,A. the compound expressed with the general formula (1) and general formula (2) of a publication to JP,6-289520,A -- concrete -- page [of the said official report] 5 - compound 1-1 - of a 7-page publication -- 1-17 and 2-1 JP,6-313936,A -- a publication -- and (** 2) (** 3) the compound expressed -- concrete -- page [of the said official report] 6 - the compound of a 19-page publication the compound expressed with the (** 1) of a publication to JP,6-313951,A -- concrete -- page [of the said official report] 3 - the compound of a 5-page publication the compound expressed with the general formula (I) of a publication to JP,7-5610,A -- concrete -- page [of the said official report] 5 - the compound I-1 to I-38 of a 10-page publication the compound expressed with the general formula (II) of a publication to JP,7-77783,A -- concrete -- page [of the said official report] 10 - compound II-1-II-102 of a 27-page publication the compound expressed with the general formula (H) and general formula (Ha) of a publication to JP,7-104426,A -- concrete -- page [of the said official report] 8 - the compound H-1 to H-44 of a 15-page publication It is specifically the compound N-1 to N-30 given in this official report with the compound which is a compound characterized by having the Nonion nature machine which forms an anionic machine, or the hydrogen atom of a hydrazine and the hydrogen bond in a molecule near the hydrazine machine of a Japanese Patent Application No. [No. 191007] publication, and is especially expressed with a general formula (A), a general formula (B), a general formula (C), a general formula (D), a general formula (E), and a general formula (With the compound expressed [Japanese Patent Application No. / No. 191007 / seven to] / with the general formula (1) of a publication, it is specifically the compound D-1 to D-55 given in this official report.

[0179] A hydrazine derivative various [given in 34 pages from 25 pages of the "well-known technology (1-207 pages)" (the Aztec company **) of March 22, 1991 issue] furthermore. The compound D-2 of JP,62-86354,A (6 pages - 7 pages), and D-39.

[0180] Hydrazine system ***** used for this invention can be dissolved and used for a suitable organic solvent (a methanol, ethanol, propanol, fluorine-ized alcohol), for example, alcohols, ketones (an acetone, methyl ethyl ketone), a dimethylformamide, dimethyl sulfoxide, a methyl Cellosolve, etc.

[0181] Moreover, by the emulsification variational method already known well, it can dissolve using auxiliary solvents, such as oil, such as a dibutyl phthalate, a tricresyl phosphate, a glyceryl triacetate, or diethyl phthalate, ethyl acetate, and a cyclohexanone, and an emulsification distribution object can be produced and used mechanically. Or by the method learned as a solid-state variational method, into water, a ball mill, a colloid mill, or an ultrasonic wave can distribute, and the powder of a hydrazine derivative can be used.

[0182] Although you may add to a base material in any layer of the layer by the side of an image formation layer, i.e., an image formation layer, and other binder layers by the side of this layer, as for hydrazine system ***** preferably used for this invention, it is desirable to add in the binder layer which adjoins an image formation layer or it.

[0183] The addition of hydrazine system ***** used for this invention has desirable 1×10^{-6} to 1×10^{-1} - two mols to one mol of silver, its 1×10^{-5} to 5×10^{-1} - three mols are more desirable, and its 2×10^{-5} to 5×10^{-1} - three mols are the most desirable.

[0184] Moreover, this invention can use a high-contrast-ized accelerator together with above ***** because of superhard tone image formation. For example, an amine compound given in U.S. Pat. No. 5,545,505 and hydroxamic acids given in a concrete target at AM-1-AM-5 and said 5,545,507 numbers, Specifically HA-1-HA-11 and acrylonitrile given in said 5,545,507 numbers Specifically CN-1-CN-13, a hydrazine compound given in said 5,558,983 numbers, Specifically, A-1 to A-42, B-1 to B-27, C-1 to C-14, etc. can be used for CA-1-CA-6, the ONYU-MU salts of a Japanese Patent Application No. [No. 132836 / eight to] publication, and a concrete target.

[0185] The synthetic method of these high-contrast-ized accelerators, the addition method, an addition, etc. can be performed as indicated by each aforementioned quotation patent.

[0186] It is desirable to use together with ***** the acid which can hydrate and do 5 oxidization 2 Lynn, or its salt to this invention, and to use it for it. As the acid which can hydrate and do 5 oxidization 2 Lynn, or its salt, they are a metaphosphoric acid (salt), a pyrophosphoric acid (salt), orthophosphoric acid (salt), 3 phosphoric acids (salt), 4 phosphoric acids (salt), hexametaphosphoric acid (salt), etc. As the acid which can hydrate and do 5 oxidization 2 Lynn used especially preferably, or its salt, it is orthophosphoric acid (salt) and hexametaphosphoric acid (salt), and there are orthophosphoric acid sodium, orthophosphoric acid 2 hydrogen sodium, hexametaphosphoric acid sodium, hexametaphosphoric acid ammonium, etc. as a concrete salt.

[0187] The acid which can hydrate and do 5 oxidization 2 Lynn which can be preferably used for this invention, or its salt is

added in the binder layer which adjoins an image formation layer or it from the point of it being little and discovering a desired effect.

[0188] Although it is good in a desired amount according to performances, such as sensitivity and fogging, as amount of the acid which can hydrate and do 5 oxidation 2 Lynn used for this invention, or its salt used (1m of sensitive material coverage per two), 0.1 - 500 mg/m² is desirable, and 0.5 - 100 mg/m² is more desirable.

[0189] It is desirable that the reducing agent for organic silver salt is included in the heat developing sensitive material of this invention. the arbitrary matter with which the reducing agent for organic silver salt returns a complex ion to metal silver -- you may be an organic substance preferably Although the conventional photograph developers, such as a phenidone, hydroquinone, and a catechol, are useful, a hindered phenol reducing agent is desirable. one mol of silver of the field where a reducing agent has an image formation layer -- receiving -- 5-50-mol % -- being contained is desirable and it is still more desirable to be contained at 10-40-mol % What layer of the field which has an image formation layer is sufficient as the addition layer of a reducing agent. When adding in layers other than an image formation layer, it is desirable to use it more mostly with 10-50-mol % to one mol of silver. Moreover, a reducing agent may be the so-called precursor guidance-ized so that it might have a function effectively only at the time of development.

[0190] In the heat developing sensitive material using organic silver salt a wide range reducing agent JP,46-6074,A, 47-1238, 47-33621, 49-46427, 49-115540, 50-14334, 50-36110, 50-147711, 51-32632, 51-1023721, 51-32324, 51-51933, 52-84727, 55-108654, 56-146133, 57-82828, 57-82829, JP,6-3793,A, U.S. JP,3,679,426,B, said -- No. 3,751,252 -- said -- No. 3,751,255 -- said -- No. 3,761,270 -- said -- No. 3,782,949 -- said -- No. 3,839,048 -- said -- No. 3,928,686 -- said -- it is indicated by No. 5,464,738, the German country patent No. 2321328, the Europe patent No. 692732, etc. For example, a phenyl amide oxime, 2-thienyl amide oxime (And amide oxime, for example, 4-hydroxy, such as p-phenoxyphenyl amide oxime - 3) Azines, such as 5-dimethoxy benzaldehyde azine; The combination; polyhydroxy benzene of the aliphatic carboxylic-acid aryl hydrazide and ascorbic acid like the combination of a 2 and 2'-screw (hydroxymethyl) propionyl-beta-phenylhydrazine and an ascorbic acid, A hydroxylamine, a reductone, and/or combination of a hydrazine (for example, with hydroquinone) Combination of a screw (ethoxy ethyl) hydroxylamine, a piperidino hexose reductone, or a HORUMIRU-4-methylphenyl hydrazine etc.; A phenyl hydroxamic acid, Hydroxamic acids, such as p-hydroxyphenyl hydroxamic acid and beta-ARININ hydroxamic acid; The combination of an azine and a sulfonamide phenol ; Ethyl-alpha-cyano-2-methylphenyl acetate, (For example, a phenothiazin, 2, a 6-dichloro-4-benzene sulfonamide phenol, etc.) alpha-cyano phenylacetic-acid derivatives, such as ethyl-alpha-cyano phenyl acetate; 2, 2'-dihydroxy -1, 1'-binaphthyl, A screw-beta naphthol which is illustrated by 6, 6'-dibromo -2, 2'-dihydroxy -1, 1'-binaphthyl, and screw (2-hydroxy-1-naphthyl) methane; a screw-beta naphthol, and 1, 3-dihydroxybenzene derivative (for example) Combination;3-methyl-1-phenyl-5-pyrazolones, such as 2 and 4-dihydroxy benzophenone or 2', and a 4'-dihydroxy acetophenone, etc., 5-pyrazolone; A dimethylamino hexose reductone,

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